

MARK TWAIN NATIONAL WILDLIFE REFUGE
Quincy, Illinois

ANNUAL NARRATIVE REPORT
Calendar Year 1987

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

MARK TWAIN NATIONAL WILDLIFE REFUGE

Quincy, Illinois

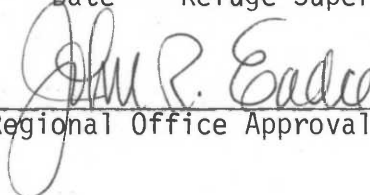
ANNUAL NARRATIVE REPORT

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Refuge Manager

3/10/88
Date

 4-4-88
Refuge Supervisor Review Date


Regional Office Approval

4/4/88
Date

NARRATIVE REPORT
MARK TWAIN NATIONAL WILDLIFE REFUGE
1987

COMPLEX HEADQUARTERS - QUINCY, ILLINOIS

WAPELLO DISTRICT OFFICE - WAPELLO, IOWA

Louisa Division
Big Timber Division
Keithsburg Division

ANNADA DISTRICT OFFICE - ANNADA, MISSOURI

Clarence Cannon NWR
Delair Division
Gardner Division

BRUSSELS DISTRICT OFFICE - BRUSSELS, ILLINOIS

Calhoun Division
Batchtown Division
Gilbert Lake Division
Portage Islands Division

DEPARTMENT OF THE INTERIOR
UNITED STATES FISH AND WILDLIFE SERVICE
MARK TWAIN NATIONAL WILDLIFE REFUGE
QUINCY, ILLINOIS



MARK TWAIN NATIONAL WILDLIFE REFUGE

LEGEND

■ Refuge Lands

* Turkey & Otter Islands are included in the Big Timber Division

** Portage Islands are included in the Calhoun Division

SCALE: 1 inch equals approximately 20 miles



CALENDAR YEAR - 1987

REFUGE STAFF

ROBERT H. STRATTON, JR., - PROJECT LEADER, GM-13.QUINCY, ILLINOIS

BERT M. (MIKE) ANDUSS - ASSISTANT PROJECT LEADER, GS-12QUINCY, ILLINOIS

T. SCOTT BATES - OUTDOOR RECREATION PLANNER, GS-11.QUINCY, ILLINOIS

LEROY W. SOWL, EMP COORDINATOR, GS-13QUINCY, ILLINOIS
TRANSFERRED FROM WASHINGTON OFFICE, APRIL 12, 1987

RITA R. BERGSTRASSER - SECRETARY, GS-5.QUINCY, ILLINOIS

GERALD E. CUMMINGS - DIVISION 2 BIOLOGIST, GS-12.QUINCY, ILLINOIS

A. WAYNE STANLEY - REFUGE MANAGER, GS-11.WAPELLO, IOWA

MARVIN C. (CHET) MC CARTY - ASSISTANT REFUGE MANAGER, GS-7.WAPELLO, IOWA

SALLY JACK - SECRETARY, GS-4.WAPELLO, IOWA

ALEXANDER B. (BEANIE) MC NEIL - MAINTENANCE WORKER, WG-9.WAPELLO, IOWA

N. ROSS ADAMS - REFUGE MANAGER, GS-11ANNADA, MISSOURI

BRAD MC KINNEY - ASSISTANT REFUGE MANAGER, GS-7ANNADA, MISSOURI
TRANSFERRED TO CRESCENT LAKE NWR, ELLSWORTH, NE, JUNE, 1987

SUSAN L. BOLANDER - ASSISTANT REFUGE MANAGER, GS-7.ANNADA, MISSOURI
TRANSFERRED FROM CRAB ORCHARD NWR, JULY, 1987

CAROLYN A. WATTS - SECRETARY, GS-4.ANNADA, MISSOURI

KEITH KIRBY - TRACTOR OPERATOR, WG-5.ANNADA, MISSOURI
TERMINATED MAY 2, 1987

GEORGE W. PEYTON - REFUGE MANAGER, GS-11.BRUSSELS, ILLINOIS

DEBRA KIMBRELL - ASSISTANT REFUGE MANAGER, GS-7BRUSSELS, ILLINOIS

DEBRA D. KUHN - SECRETARY, GS-4BRUSSELS, ILLINOIS

EUGENE A. SIMON - MAINTENANCE WORKER, WG- 9BRUSSELS, ILLINOIS

GENERAL

A. Organization

The Mark Twain National Wildlife Refuge, formally established in 1958, lies within three states - Iowa, Illinois, and Missouri. Its area of influence extends for 250 miles along the Mississippi River Valley and a short distance up the Illinois River from its confluence with the Mississippi. It is composed of three Districts and a total of nine Divisions. Each District is composed of three Divisions: Wapello, Iowa, District - Louisa (IA), Big Timber (IA), and Keithsburg (IL); Annada, Missouri, District - Gardner, (IL), Clarence Cannon (MO), and Delair (IL); and the Brussels, Illinois, District - Calhoun (IL), Batchtown (IL) and Gilbert Lake, IL.

Completing our thirty-ninth year as a member of the National Wildlife Refuge System, the overall Complex recovered from a preceding fall of record high water levels to a near record low level from the Mississippi River during the past fall period. This drastic change from abnormally-high to below normal water conditions caused management intrinsic to each situation on the Divisions. This dry period permitted temporary repairs to be completed on damaged levees at both the Keithsburg and Cannon Divisions, but hindered both moist soil management production and farming activities.

Sale of surplus farm crops was vastly improved since dry weather permitted harvest of crops often lost to fall flood waters. Moisture necessary for plant growth came sparingly but permitted \$31,000 + to be deposited in the 5092 fund. This fund is used for maintenance on General Plan (GP) lands as 8260 monies. Expenditures totalled \$12,643 for 1987.

Total 1987 AWP budget for the Complex Office was \$242,200 under subactivity 1261 and 1262. All basic operations were covered by funding. For the second year in a row, our video program has seen limited use due to lack of funding.

B. Personnel

Staff changes included the following:

Brad McKinney and family transferred from the Annada District to Crescent Lake National Wildlife Refuge as Assistant Manager in June, 1987.

Sue Bolander transferred to the Annada District from Crab Orchard National Wildlife as Assistant Manager, July, 1987, replacing Brad.

LeRoy Sowl transferred from the Washington Office to the Mark Twain National Wildlife Refuge as Environmental Management Program Coordinator and was stationed at Ecological Services Office at Rock Island, Illinois, April, 1987.

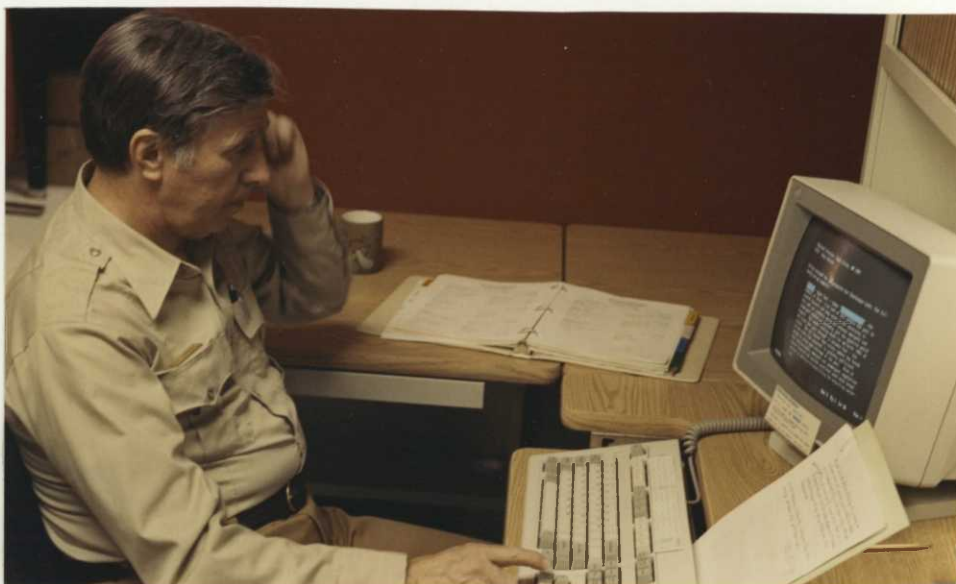
Keith Kirby, Tractor Operator at the Annada District, was terminated on May 2, 1987.

C. General Activities

The Accelerated Refuge Maintenance Management (ARMM's) program totalled \$30,000 for the Quincy Office. One major building project was concluded on the Complex, the construction of the equipment storage building at the Brussels District Office complete with concrete floor, with final inspection on November 18, 1987. Hold-over projects completed this year included the new shop building at Louisa Division and the levee rehabilitation at Clarence Cannon National Wildlife Refuge. Ditch rehabilitation at Delair Division and lake dredge rehabilitation at Swan Lake were also completed. Details are listed in each District's section. LeRoy Sowl transferred in from the Washington Office and took over the enormous job of full-time Environmental Management Program Coordinator and settled in the Quad City area with office space in Ecological Services Office in Rock Island, Illinois.

New Computer System - A new IBM computer system began arriving in October, 1987, and became operational as the year ended. The process of staff orientation/operation is slowly progressing. The system is composed of an IBM PS/2, Model 60 computer with hard drive, color monitor, Hewlett-Packard LaserJet printer, tape backup drive, modem and word processing, spreadsheet, data base and business graphics software. With five people in the office, we have quickly found that one computer doesn't go very far and are in hopes of expanding our system to individual networked terminals in 1988.

"From the brain
to the screen.
Fantastic!!!"



"This key,
Scott?"



"It sez..."



"What happened?
No, not again!!"



Complex visitors included: John Ellis, Jay Hamernick, RF-2; Tom Worthington, Technical Services; Earl Markwell, Regional Safety Officer; Randy Porter, DeSoto National Wildlife Refuge, Department of Conservation's Conservation Police Officers Glenn Sanders, Mike Schell and Dennis Michaels; Roger Boykin, RF-2 Forester; Tim Feavil and Jim Hong, Corps of Engineers Foresters; Retired Agent Dean Tresch; Art Hughlett, National Wildlife Refuge Association; Cal Gale, Regional Forester; Dennis Novak, GSA; Senior Resident Agent John Mendoza, and numerous others.

Quincy staff members were involved in numerous state, Corps of Engineers and Service meetings; Farm Bill; Cooperative Agreements on General Plan lands; timber surveys and forest management meetings with state and Corps of Engineers staff; Gardner Division Deer Hunts; meetings on Thompson Lake studies for acquisition; dredging spoil site surveys; public use management workshop at DeSoto National Wildlife Refuge; operations inspection by Regional Office; draft sign manual reviews; coordinated observation platform (Cannon) construction and signing; documentation of flood damages; Complex leaflets; develop curriculum for Law Enforcement refresher; Upper Mississippi River Conservation Commission meetings; numerous school group and club meetings, etc.

One item stands out as the year closes: an earthquake occurred at 6:53 p.m. on June 10, 1987, in eastern Illinois, shaking the area, and measured 5.0 on the Richter scale.

Mr. Jerry Cummings, Biologist, reached the 30-year tenure peak in the Fish and Wildlife Service, and also received a cash award for his effort as Acting Environmental Management Program Coordinator.



"Let's talk retirement, Jerry!"

D. Public Affairs

Public affairs activities for the year included presentations to area interest groups on a variety of subjects, National Hunting and Fishing Day activities, local news media contacts and limited work with the refuge's videotape program.

Work was completed on an update of the Complex general leaflet, but not in time to take advantage of available fiscal year 1987 funding for printing. Work was also started on development of much-needed leaflets for most of the refuge's individual divisions. A leaflet for the Gardner Division was sent to the Regional Office for copying by the end of the year. The Complex outdoor recreation planner assisted the Clarence Cannon Refuge staff with development of interpretive concepts for their new headquarters observation deck and with design of an information and regulations sign for the Bear Creek Unit.

The refuge's videotape production program continued on hold due to lack of funding. Short (five minute) public orientation programs were completed for the Calhoun and Louisa Divisions early in the year and two programs were produced for Swan Lake National Wildlife Refuge. Beyond those small projects however, little else was done during the year.

E. Environmental Management Program (EMP) Coordinator

Public Law 99-88 authorized the funding of an environmental management program contained in Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662).

This authorized program consists of:

1. a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement (HREP);
2. implementation of a long-term resource monitoring program (LTRM); and
3. implementation of a computerized inventory and analysis system.

The Mark Twain National Wildlife Refuge has been delegated responsibility for the Habitat Rehabilitation and Enhancement portion of the program in the area south of Rock Island, involving national wildlife refuges and state-managed General Plan lands of the Corps of Engineers. The proposed list contains projects which are associated with non-General Plan lands, such as state fee title areas. These are the responsibility of the Ecological Services (ES) Offices at Rock Island and Marion, Illinois. In addition, as part of their regular activities, the Ecological Services Offices are responsible for preparation of coordination act reports, assistance to the Corps in the preparation and review of environmental documents, permit review and endangered species consultation. This entails close coordination between the Ecological Services Offices to make sure that everyone is singing the same tune. In addition, the projects within the Rock Island District are split with the Upper Mississippi Refuge.

The Upper Mississippi Refuge is directly involved with the States of Minnesota, Wisconsin, Iowa and Illinois. The Mark Twain is involved with the States of Iowa, Illinois and Missouri. This overlaps with the Rock Island District, and requires close coordination between the two refuges.

With five states involved, a wide divergence of philosophy and local interest is introduced into the program. Another factor that assures of lack of homogeneity is the involvement of three operationally-autonomous Corps of Engineers districts, one of which answers to another Division.

All of these factors contribute to an operating environment which entails a tremendous amount of coordination. Meetings, meetings, and more meetings are a distasteful but essential part of the work. This is all an investment in the future, since to date, not a single project has been completed.

Initially, the program was coordinated by Division Biologist, Jerry Cummings. In mid-April, LeRoy Sowl was assigned as the Environmental Management Program Coordinator for the southern half of the program area which includes the Illinois River and Chautauqua Refuge as well as the Mark Twain.

Currently there are twenty-seven active or proposed projects in the southern program area. In addition, a number of other projects are being evaluated for a determination of their potential for inclusion in the program.

Table Environment Management Program 1 summarizes the activity with each of the Habitat Rehabilitation Enhancement Program projects in 1987 and projects the activity within 1988.

TABLE EMP-1
Status of Habitat Rehabilitation and Enhancement Projects

PROJECT	1987 ACTIVITY	1988 PLANS	COMMENTS
<u>ROCK ISLAND DISTRICT</u>			
1. Monkey Chute MO	Dredge contract awarded 11/14.	Complete Project.	Dredging will require about 4 days on site. Site now iced in. Excessive unionized Ammonia on site. Dredging must be confined to a time when water temperature is less than 60° F and pH is basic.
2. Chautauqua Lake FW	Site review held in June.	Decision by Fish and Wildlife Service.	This project now on hold awaiting a decision by Fish and Wildlife Service. Project not previously ranked by Fish and Wildlife Interagency Committee, Corps of Engineers would require this step if project is resumed. A potential problem is the high level of ammonia in sediments.
3. Big Timber IA	Site visit in July.	Initiate design.	Fact sheet awaiting approval at A/S Army. Project design on hold until this approval is granted.
4. Peoria Lake IL	Site visit in November.	Initiate design.	State area, not general plan land. Fact sheet not yet approved.
5. Bay Island MO		Initiate design FY1988	Ranked "B" by Fish and Wildlife Interagency Committee.

TABLE EMP-1 continued
Status of Habitat Rehabilitation and Enhancement Projects

PROJECT	1987 ACTIVITY	1988 PLANS	COMMENTS
6. Gardner Division FW	No action.	Revise Proposal.	Design scheduled for FY1992.
7. Cottonwood Island MO	Project tabled.		State concerned about poor cost/ benefit ratio.
8. Credit Island	Dropped		No sponsor.
9. Huron Island IA	None	None	Ranked "B".
10. Lake Odessa IA	None	None	Project Ranked "B". Repair of levee is deferred maintenance.
11. Louisa Division FW	New	Combine with Lake Odessa.	The outer levee on Louisa is a structure integral to Lock and Dam 17. Corps of Engineers is responsible for its maintenance. Manipulation of water in area can impact state management area. Project should be combined
12. Big Timber FW	New	Rescope and rank.	Corps of Engineers feedback is that bank erosion is generally not above what is expected. We need to reevaluate the impact of bank erosion locally and combine this project with dredging at Turkey and Otter Islands.

TABLE EMP-1 continued
Status of Habitat Rehabilitation and Enhancement Projects

PROJECT	1987 ACTIVITY	1988 PLANS	COMMENTS
13. Keithsburg FW	New	Coordinate and rank.	This project has a verbal "No problem" from B. Donels. Should have formal coordination so State of Illinois is on record as agreeing.
14. Rice Lake IL	Site visit in November.		State land not General plan. Ranked "A" by Fish and Wild-. life Interagency Committee.
15. Banner Marsh IL	Proposed	Rank and submit.	Segregated from Rice Lake at direction of Corps of Engineers.
16. Sanganois IL	Proposed	Rank and submit.	State area, not General Plan land.
17. Quincy Bay - IL	Proposed	Coordinate, rank and submit.	General Plan lands.
<u>ST. LOUIS DISTRICT</u>			
1. Clarksville	Submitted to A/S Army.	Contract	This project has been held up in Pentagon for months. Fish and Wildlife Service input completed.
2. Dresser Island	Project design.	1. Complete definite project report 2. Coordination Act Report,	Draft definite project report now scheduled for February, delay anticipated.

TABLE EMP-1 continued
Status of Habitat Rehabilitation and Enhancement Projects

PROJECT	1987 ACTIVITY	1988 PLANS	COMMENTS
2. Dresser Island continued.		3. Refuge com- patibility determination, 4. Submit DPR to A/S Army for approval.	
3. Swan Lake FW	Resolution of conflicts with IL; Field Recon (site visit) in October.	Commence design?	St. Louis District has recom- mended this as next design. No feedback from A/S Army at this time.
4. Pharr's Island MO	Scoping meeting between COE and State in March.	Begin design.	Projects have not been ranked in St. Louis District because of opposition from State of Missouri.
5. Osbourne Side Channel IL	On hold.		This project is in river below Lock and Dam 27 where there is no General Plan land. Illinois gives this high rank but must commit to 25% cost sharing before project can proceed.
6. Alton Pool side channels IL	Partial field recon in October.		No land sites involved, this is a stream improvement project scaled up for a river.
7. Stump Lake IL	Field recon in October.		General Plan lands.

TABLE EMP-1
Status of Habitat Rehabilitation and Enhancement Projects

PROJECT.	1987 ACTIVITY	1988 PLANS	COMMENTS
8. Bachtown IL	Field recon in October.		General Plan lands.
9. Pools 25 and 26 MO			Conceptual stage, General Plan lands.
10. Wetland Develop- ment MO			Conceptual stage.
11. Cuivre Island MO	Scoping meeting held, Marion Office invited but did not attend.	Develop fact sheet.	State land.

Louisa National Wildlife Refuge

Annual Narrative Report
Calendar Year 1987

U.S. Department of the Interior
Fish and Wildlife Service
National Wildlife Refuge System

REVIEW AND APPROVALS

LOUISA NATIONAL WILDLIFE REFUGE

Wapello, Iowa

ANNUAL NARRATIVE REPORT

Calendar Year 1987

<u>Wayne Stanley</u> Refuge Manager	<u>3/11/88</u> Date	<u>Wattman E. Kerschbaum</u> Refuge Supervisor Review	<u>4-4-88</u> Date
<u>Charles H. Shalton</u> Project Leader	<u>3/15/88</u> Date	<u>John R. Eadie</u> Regional Office Approval	<u>4/8/88</u> Date

Introduction

Louisa consists of the Louisa, Big Timber and Keithsburg Divisions of the Mark Twain NWR. The refuge was formed with the Fish and Wildlife Coordination Act of 1958 (P.L. 85-624). Prior to '58 the refuge was managed on a "post and patrol" basis as a portion of the Upper Mississippi River Wild Life and Fish Refuge. The refuge is managed under cooperative agreement with the U.S. Army Corps of Engineers. Except for the 40-acre headquarters site and a 6-acre public access at Keithsburg, the entire refuge is General Plan Land owned by the Corps of Engineers.

Refuge objectives include:

1. Provide undisturbed feeding and resting areas for migrating waterfowl.
2. Improve and maintain habitat to perpetuate optimum annual production of wood ducks.
3. Maintain balanced populations of resident wildlife.
4. Maintain portions of river bottom habitat in a natural state.
5. Provide for limited day-use recreation.

Louisa is located six miles east of Wapello in Louisa County, Iowa. From 1919 until 1947 the refuge was part of the Muscatine-Louisa County Drainage District and was intensively drained and farmed. With the Corps' 9-foot river channel project, the refuge was acquired mainly through condemnation procedures. Habitat consists of:

Bottomland Timber	- 984 acres
Cropland	- 400 acres
Moist Soil	- 197 acres
Marsh and Water	- 759 acres

Major management activities consist of cooperative farming and water management. The State of Iowa's Lake Odessa Management Area (4,000+ acres) borders the refuge on the south. This area is managed by the Iowa Department of Natural Resources under a cooperative agreement with the Fish and Wildlife Service and the U.S. Army Corps of Engineers. Management emphasis on the area is directed toward public hunting.

The 1,758-acre Big Timber Division is located three miles north of Louisa in Louisa County. The refuge consists of 1,258 acres of bottomland timber and 500 acres of backwater sloughs and marshes. The refuge lies outside the Mississippi levee system and is dominated by fluctuations of the Mississippi River. The refuge is open year-round to public use including hunting and fishing.

The Keithsburg Division is located a mile north of the city of Keithsburg in Mercer County, Illinois. The refuge is 45 road miles (one way) from the headquarters at Louisa. The refuge consists of 775 acres of bottomland timber and 585 acres of open water/marsh. Management is limited primarily to water management.



Wayne Chet Beanie Sally

Personnel

<u>Name</u>	<u>Title/Grade</u>	<u>Status</u>
Wayne Stanley	Refuge Manager, GS-11/6	PFT EOD 9/20/82
Chet McCarty	Assistant Manager, GS-7/4	PFT EOD 12/09/84
"Beanie" McNeil	Maintenance Mechanic, WG-9/5	PFT EOD 2/10/64
Sally Jack	Secretary, GS-4/4	PFT EOD 5/27/84

YCC Personnel

Sheldon Fry 6/08/87 - 7/31/87

Volunteers

	<u>Hours</u>
Jack Gustison (Photography)	134
Lee Hovell (Programs)	8
Doug Schnoebelen (Nesting Structures)	48
Ron Cross (X-mas Bird Count)	8
Ed Wiederrecht (X-mas Brid Count)	8
Jeff Weikert (Auto Tours)	16
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A. HIGHLIGHTS

New shop completed...Section I. 1.

Cropland program revised...Section F. 4.

Long delayed maintenance activities accomplished...I. 2.

Heavy equipment lost...Section I. 4.

Giant Canada geese transplanted...Section G. 3.

Auto tours restarted...Section H. 5.

Dry conditions...All.

B. CLIMATIC CONDITIONS

1987 was a year of extremes in this part of Louisa County. The period January - August was extremely dry with precipitation nearly 12 inches below normal. The early fall was also very dry well into mid-November. The winter was exceptionally mild and temperatures fluctuated widely almost on a daily basis during January - March. As a result, overwintering wildlife came through the winter in excellent condition, and when coupled with the dry spring an excellent production year was achieved by resident wildlife. Ice out on refuge impoundments was complete by February 18 or about three weeks earlier than normal. Habitat conditions for migrants and breeding wood ducks was excellent through March. After that things went downhill due to the drought-like conditions and the draw down on Lake Odessa. The fall was dry and mild with temperatures generally above normal until mid-November. This, again, hampered habitat conditions since the Mississippi River remained low which made it difficult to gravity flow water to refuge impoundments and Lake Odessa. The year ended on a wet note, however, with December being the fifth wettest on record. A 14-inch snowfall occurred on December 19. Ice up on refuge impoundments was complete by December 20.

D. PLANNING

2. Management

Revised Cropland Management Plan to account for switch from cooperative farming towards contract/custom farming.

Search and Rescue Plan completed.

Marsh and Water Plan completed.

WEATHER DATA

Month	Precip.	Normal	Differ.	Snow-fall	Average High	Average Low	Temperature		Extreme Low	Date	Remarks
							Extreme High	Date			
Jan.	0.85	1.51	- 0.66	Trace	35	20	50	12	- 3	23	
Feb.	0.04	1.30	- 1.26	Trace	47	26	58	2	14	9	
Mar.	2.93	2.44	+ 0.49		54	34	74	7	17	10	
Apr.	2.19	3.12	- 0.93		69	43	89	20	20	4	
May	0.93	3.98	- 3.05		81	57	90	20	39	5	
June	1.77	4.40	- 2.63		88	65	98	14	52	4	
July	1.69	3.45	- 1.76		91	68	100	26	57	14	
Aug.	5.57	1.94	+ 3.63		88	66	102	11	50	24	
Sept.	2.57	4.23	- 1.66		81	57	96	5	46	25	
Oct.	0.36	2.54	- 2.18		65	41	82	1	28	11	
Nov.	3.76	2.10	+ 1.66	2"	55	38	78	3	18	21	
Dec.	3.11	1.51	+ 1.60	18"	41	29	54	8	7	17	
Annual	25.77	32.52	- 6.75	20"			102	Aug. 11	- 3	Jan. 23	

Fisheries Management Plan continued with much data collection on the District along with coordination of surveys and data with Iowa DNR and Illinois DOC.

E. ADMINISTRATION

1. Personnel

The following displays the refuge's staffing pattern for the past five years:

	<u>PFT</u>	<u>TFT</u>	<u>PPT</u>	<u>FTE</u> <u>TOTALS</u>
FY88	4	-	-	4.00
FY87	4	-	-	4.00
FY86	4	-	-	4.00
FY85	5	1	-	4.26
FY84	3	1	-	3.67

No personnel changes occurred during the year.

2. Youth Programs

The refuge had only one YCC enrollee in 1987. Full-time supervision was provided by Assistant Manager McCarty. Major projects undertaken included moist soil vegetation transects, painting the storage building, and maintenance of public accesses and parking areas. 1987 was an accident-free year for YCC.



Moist soil vegetation
transects - M.S. 8.
7/87 WS

4. Volunteer Program

Seven volunteers were active during the year. Activities included photography, Christmas Bird Count, constructing mallard nest baskets, assisting with auto tours, assisting with special tours and programs and refuge farming. A total of 230 volunteer hours were contributed to the refuge program.

5. Funding

5-Year Funding Pattern

	<u>FY88</u>	<u>FY87</u>	<u>FY86</u>	<u>FY85</u>	<u>FY84</u>
1260	141.9	130.0	120.1	147.6	137.0
1520	1.7	1.77	5.5	5.5	10.0
8260	-	0.50	2.2	0.3	6.7
ARMM	<u>50.0</u>	<u>37.0</u>	<u>154.0</u>	<u>102.8</u>	<u>24.0</u>
	193.6	169.27	281.8	256.2	177.7

FY87 was an uncertain year for funding. Throughout the year we were thoroughly confused by recisions, contingency take-aways and add-backs, FERS and Pay Act monies and ARMM funds left from individual ARMM projects. It seems like we were constantly contacting the RO to determine what we had and trying to hold on to ARMM funds. As it turned out, we expended over 99% of our fund target. We did lose nearly \$2,500 that was earmarked for production of Complex leaflets due to miscommunication between the Complex and the RO.

Fixed costs continue to take a large bite out of our budget. If it were not for ARMM funds, the station would be in very sad shape.

FY88 contains one bright spot, however, with special flood damage monies received to repair damages to the Keithsburg Division river levee resulting from the severe flooding in 1986. Funds initially totalled nearly \$1.6M but have since been scaled back to nearly \$1.2M. In either case, funds should be ample to rehabilitate the entire levee.

The decline in 8260 funds has occurred due to dwindling cash crop farming on Louisa and the remainder of the Complex. We anticipate these funds will remain near the zero mark in future years.

YCC funding is simply inadequate to conduct an efficient program even for one enrollee. Funds for supplies and materials need to be increased to a level at least equal to salary costs.

6. Safety

1987 was a rather 'uneventful year. Other than a mild case of poison ivy, we had an accident-free year--the first in several! Staff safety meetings were held monthly on the following topics:

January	Winter driving hazards
February	Driving techniques
March	Cholesterol screening
April	Water safety
May	Canine rabies
June	Driving safety
July	Accident prevention on the job
August	Hearing test
September	Hearing protection
October	Visitor safety
November	None
December	Accident prevention

The entire staff underwent audiometric testing to establish baseline data for the hearing conservation program. All refuge equipment was tested for hazardous noise levels.

Refuge vehicles were operated 21,400 accident-free miles and the station's record is 52,274 hours since the last lost-time accident.

8. Other Items

The refuge began to get involved in Farm Bill activities during the year by offering assistance to SCS and ASCS offices in the vicinity of the refuge on Conservation Reserve Program (CRP) signups with emphasis on wetlands and cover development. FmHA inventory properties were also reviewed to determine if any tracts could be added to the District.

Late in the year, the District was assigned the counties of Louisa, Washington, Henry, Des Moines, Lee and Muscatine in Iowa and Mercer in Illinois to coordinate Farm Bill activities at the local level. Activities include screening FmHA inventory lands in all counties for important resource values to be protected via deed restrictions/easements. Primary emphasis will be on wetlands and flood plains. In addition, the refuge will continue to provide assistance with CRP signups in encouraging wetland restoration wherever possible. Also, the refuge will review all prior CRP signups within the counties for restorable wetlands and offer FWS assistance to restore those wetlands.

Revenue sharing checks were presented to Louisa (\$180) and Mercer (\$94) Counties. The small payments are due to the limited fee title acreage on the District, but the counties are still pleased to receive the monies.

An operational inspection was conducted on the refuge in June by an RO team consisting of RF2 Supervisors, Safety, Public Use, and Administration. The inspection went well with the refuge receiving high marks in the areas of Administration and Safety. Areas for improvement involved public use such as general leaflets, improved interpretive facilities, auto tours, improved signing and the like. In other words, nothing a few extra dollars couldn't take care of.

During the bidding procedure in our trapping program, we rejected a bid for the fall program. The applicant had received a trapping permit in 1986 but we ran into a few problems with the individual in 1986. The individual failed to remove all trapping gear from the refuge until August, 1987, used access to the refuge to take the family fishing, and used the refuge as access to set traps on land of two refuge neighbors without their permission. The individual was a little hot when we rejected the bid and appealed through CFR procedures. We assume the individual decided to drop the appeal as we have heard nothing since November.

EMP - The refuge submitted several projects for funding through the EMP process. The projects entailed shoreline protection, levee rehab., moist soil development and reclaiming backwater sloughs and marshes. The projects are fairly low priority in terms of the EMP process and will likely not receive funding prior to 1990 if then.

F. HABITAT MANAGEMENT

1. General

Overall, habitat conditions were the exact opposite from 1986. Drought conditions prevailed until the end of August with precipitation nearly 12 inches below normal to that time. The drought caused failure of DNC seeddowns and previous tree plantings. In addition, the Iowa DNR's draw down of Lake Odessa coupled with the drought made it impossible to retain water in moist soil areas. As a result, waterfowl brood habitat was very limited on the refuge. To top things off, the Mississippi remained low during the fall, thereby hampering the refilling of Lake Odessa and refuge impoundments. This was a very unusual occurrence with no one being able to remember a year where the river remained so low for so long.

Emphasis in 1987 was placed on maintenance activities associated with moist soil and control structures in order to take advantage of the dry period. Many projects delayed for several years by prevailing wet conditions were finally completed.

Emphasis for the future will include development of additional moist soil habitat from retired croplands. In addition, the cropland program will undergo improvements to meet waterfowl maintenance objectives. Coordination of water levels on the refuge and Lake Odessa remains a challenge annually. The fact we have to "share" the inlet and outlet

control structures impacts our ability to manage water effectively and efficiently on the refuge. As a result, management objectives for waterfowl maintenance and production are being constrained.

2. Wetlands

Management Summary

Put simply, 1987 was exactly opposite of 1986. Dry, extremely dry, conditions prevailed throughout the year, and for the first time in at least five years the Mississippi experienced no significant rises and no floods. These conditions teamed to alter planned water management strategies, especially fall flooding of moist soil areas.

Ice out was complete by February 18, and from then until the end of August water levels continually receded. Lake Odessa employed an early draw down of the lake to 535.0 before July 4, and after down to 532.96--the lowest level in many years. As a result, the refuge was unable to maintain adequate brood habitat on moist soil areas as planned. The upper reaches of Muscatine Slough and Little Goose Pond were dry throughout most of July and August and produced lush stands of moist soil vegetation. Public fishing on the refuge was nearly eliminated during this period due to the low water levels. Beginning in mid-August, Iowa DNR began refilling Lake Odessa, and on August 31 the refuge received a 5-inch+ rainfall--the only significant rain since April. By mid-September the DNR was having difficulty filling the lake due to low levels in the Mississippi. As a result, planned flooding of moist soil areas for early migrants on the refuge was delayed. The inlet tubes remained open to the lake until late October when the DNR was convinced the refuge needed water to attract a few ducks. By mid-November refuge water levels were still well below planned.

Iowa DNR Lake Odessa Management Summary

The DNR finally installed water gauges (msl) in mid-summer, but only at Shaffer's Access. The gauges were not surveyed in but were "eyeballed" based on water levels and our gauge reading at Inlet Structure. The State-owned inlet and outlet structures continue to deteriorate, but DNR engineers have inspected the structures and prepared plans for needed repairs.

- The lake was drawn down to near 533.0 for most of July and August. Japanese millet was seeded on mud flats with the bulk seeded on the controlled hunting area A. Response was good as was response by natural moist soil vegetation which apparently out produced the Japanese millet. Due to low river levels, reflooding of the lake for the waterfowl hunting season was lengthy and difficult. Many hunters complained of difficult access through cuts and ditches, but we feel the access problem is due to siltation. These ditches need to be cleaned instead

of increasing water levels to accommodate large boats. By November water levels on the Lake were up to 535.5 or near planned levels.

Management Discussion

Moist Soil 1

Vegetation transects indicated a wide variety of species including marsh smartweed, nodding smartweed, giant burreed, wild millet, rice cutgrass, cocklebur, arrowhead and bidens. Vegetation was very rank with an average Robel reading of 8.3. Seed production was hampered by the drought-like conditions that prevailed throughout the growing season. The dike, damaged by muskrats and high water in 1986, was patched and reshaped on the west end under contract utilizing ARMM funds. Fall waterfowl use was very limited until late November. An estimated 1,500-2,000 ducks utilized the unit daily once they started into the area. Very few geese used the area. This area has historically been the most productive on the refuge, but for the past four years use has been limited and we are at a loss to explain it.

Moist Soil 2

This area was manipulated via disking and planting. The area had declined to no use by fall migrants and river bulrush was invading badly. For the first time in over ten years the entire area was heavy disced and planted to equal strips of corn, Japanese millet, and milo, and one strip was left fallow as a control to evaluate the effectiveness of heavy disking. Unfortunately, sufficient water levels were not attained to flood M.S. 2 as planned. However, food sources should be available for spring migrants and brood use in 1988.

Moist Soil 3

This area was dry for over six months of the year. Vegetation response was dramatic with significant decreases in marsh smartweed and increases of nodding smartweed and bidens. Vegetation was tall and rank with average Robel readings of 10.3 for the area. Strips were mowed across the unit in order to enhance waterfowl use of the rank vegetation. Water did not begin to flood the area until reaching a level of 535.24 at Fox Pond on October 23. Waterfowl use was almost immediate with large numbers of mallards and pintails utilizing the mowed strips. However, they appeared to avoid the standing strips almost entirely. By mid-November water had crept 2/3 of the way across the unit and waterfowl continued to use the area especially during the early evening hours.

Moist Soil 4

Dominated by marsh smartweed in 1986, this unit displayed a dramatic change in vegetation to nodding smartweed, burreed, bidens, rice cutgrass and wild millet. The area was dry for over five months with large, deep cracks in the soil. The areas planted to Japanese millet in 1985 came in to near solid stands of nodding smartweed in 1987. The area received good waterfowl use around Little Fox Pond as soon as the area began reflooding in mid-October.

Moist Soil 5

The south half of this area was heavy disced and planted to Japanese millet in early July to control an infestation of river bulrush. The entire unit had been scheduled to be disced but conditions did not permit until too late in the year. Japanese millet response was excellent, but we were unable to attain sufficient water levels (537.0) to reflood the seeddown. The north half of the unit developed a rank stand of vegetation consisting of burreed, nodding smartweed, rice cutgrass, marsh smartweed, arrowhead, and redroot. Waterfowl use beginning in mid-October was excellent with 2-3,000 ducks utilizing the area on a regular basis. The Japanese millet was utilized by 3-5,000 geese on a daily basis during mid-November.

Moist Soil 6

The area was dry for six months of the year with deep cracks in the soil. Water began spilling into the area at the end of October, but waterfowl use was limited. Dense stands of nodding smartweed, bidens, wild millet, redroot and other sedges were available. Strips were mowed to enhance waterfowl use in September.

Moist Soil 7

This area remained dry throughout the year. The unit was disced and planted to buckwheat in early July. The buckwheat was nearly overtaken by pigweed, ragweed, and cocklebur. Food availability for spring '88 migrants should be excellent.

Moist Soil 8

This unit has generally been dominated by arrowhead and favored by geese in the fall. The unit was dry for nearly five months of the year with deep cracks in the bottom. Vegetation consisted of nodding smartweed, wild millet, rice cutgrass, arrowhead, and cocklebur. The unit was reflooded and dried out several times from mid-September to November. On November 17, an estimated 6,000 mallards were feeding on the unit.

Moist Soil 9

The unit was disced and planted to milo in June. Milo was broadcast planted at a rate of 50 lbs./acre which we discovered was way too heavy. In spite of the drought conditions a good stand developed. However, due to the low river levels it was impossible to reflood the area adequately in the fall. The area received limited use along the edges by mallards and Canada geese until mid-November when approximately six inches of water was on the area. At that time use by ducks was excellent with an estimated 4,000 ducks on the area.

Moist Soil 10

This unit was heavy disced in June and August to control heavy infestation of willow. The unit responded to short marsh smartweed. The area was reflooded and dried out (on its own) several times from September - November. On November 15, approximately 1,500 mallards and pintails were utilizing the flooded marsh smartweed.

Fox Pond

Fox Pond proved to be the most productive in several years. Waterfowl brood use was good with broods of wood ducks and mallards observed throughout the summer. A gradual drawdown was employed beginning in mid-March with the area maintained dry from June 1 until August 30. Vegetation response was excellent with a very wide variety of vegetation developing throughout the drawdown period. Very dense stands of nodding smartweed and millets developed, some of which exceeded eight feet in height. Seed production appeared excellent throughout the area. Reflooding of the area by 6-inch increments commenced September 1 and response by waterfowl was excellent. Several thousand blue and green-winged teal used the shallow water vegetation throughout September. Canada geese were observed feeding on the area throughout September and October along with several thousand mallard, pintail, and wigeon. Approximately 4,000 coots were observed on Fox Pond in mid-October. Flooding was accelerated in mid-October in order to flood adjacent moist soil areas. At the close of the year, levels were at 535.8 or near planned levels. A more ideal level of 537.0 would have permitted flooding more moist soil habitat, but that level was not attainable due to low Mississippi levels. Commercial fishermen removed over 31,000 pounds of rough fish during the drawdown.



Vegetation response to Fox Pond
draw down--it got better.

7/87

WS

Prairie Pocket

A drawdown of Prairie Pocket was employed to encourage aquatic vegetation. The drawdown began in late April, and by May 4 the area was nearly dry. Continual pumping at Fox Pond was required to maintain the drawdown due to seep water from the Mississippi. Even though the Mississippi was low, seep was still strong into the area. Vegetation response was good but was unable to mature as we had to discontinue pumping due to funds. Waterfowl use early in the fall was the best in a long, long time with several hundred ducks and geese using the area on a regular basis during September and October.

Little Fox Pond

This area failed to dry completely throughout the summer drought-like conditions. The ditch to Little Fox was cleaned in August as this drain had not been cleaned since construction in the early 1960's. Fall waterfowl use was good and use by coots was excellent.

Muscatine Slough

A new control structure was installed in place of a drain culvert on the slough crossing at the north end of Field 29. The new structure will enable minor management of approximately 20 acres during times of draw down on Lake Odessa or reflooding of Lake Odessa. The area will improve wood duck brood habitat availability during periods of draw down.

Mollie Walker

Drain culverts were removed from the Port Road and a half-riser structure installed at Muscatine Slough in an effort to retain spring runoff on the Mollie Walker tract for spring migrants and breeding pair use.

Maintenance

The drought-like conditions permitted a substantial amount of maintenance to be accomplished on water management facilities:

1. Temporary repair of the 1986 Keithsburg levee break.
2. Repair of high water and muskrat damage on M.S. 1 dike.
3. Repair of high water damage and road on M.S. 8 dike.
4. Repair of ice-damaged control on M.S. 6.
5. Removal of drain culverts and installation of control structure on Mollie Walker Tract.
6. Installation of control structure on Muscatine Slough crossing.
7. Cleanout of approximately two miles of ditches on M.S. 2, 3, 4, 5 and Little Fox Pond.
8. Manipulation of M.S. 2, 3, 5, 9 and 10 via discing or mowing.

3. Forests

Due to the extreme dry periods during the year, red oak seedlings planted in Field 7 in 1986 kicked the bucket. There are no plans to replant this small, marginal area.

The 1985 planting on Field 22 was deemed a total failure. The field was tilled throughout the summer and planted to a fall seeddown of DNC.

The timber resource continues to show the effects of the stress created by the high water conditions experienced for the past several years. This is especially visible throughout the Lake Odessa area with large blocks of dead timber in many areas. So far the State has shown little concern for this impact.

4. Croplands

Cooperative farming came to an end in 1987. Our cooperator of many years decided the refuge program was no longer economical in their overall operation and withdrew from the refuge. The decision was made at the Complex level to continue a cropland program on Louisa utilizing contract/custom operations vs. cooperative farming. With this approach

the refuge is to rely on securing approximately \$9,000 annually in O & M dollars to conduct a cropland program consisting of:

1. Goose Browse - 100-125 acres (winter wheat)
2. Clover Rotations - 100-125 acres
3. Wildlife Crops - 100-125 acres (corn, milo, millet, buckwheat, etc.)
4. Moist Soil Manipulation - 100 acres

With the loss of our cooperator in 1987, we were a little puzzled on what to do with the program. Since it's an integral part of our total operations, we decided to give it a try on our own. Utilizing equipment we had on hand and some we were able to borrow from refuge neighbors and the DNR, we were able to put together a fairly decent program.

No pesticides or fertilizers were used in the program and we doubt any will be used in future years based on the results we saw this year.

Approximately 85 acres of corn was planted on the higher ground in strips approximately 120 feet wide. Planting was done, generally, with a two-row planter. The corn was cultivated twice during the growing season to control competition but with limited success due to the dry conditions and amount of ground to cover. Weed competition was markedly less on ground that had been in winter wheat in 1986 when compared with corn planted on idle ground. Yield was better than we had anticipated ranging from 22 - 102 bushel/acre on individual fields for an average of 38 bushel/acre. We didn't think this was too bad considering the summer drought, the equipment we were working with and discontinuing pesticides and fertilizers. The seed corn was donated to us by the Pioneer Seed Company with a stipulation it not be harvested. Our former cooperator, Walker Brothers, saw we were a little behind schedule and volunteered to plant Field 26 for us. They prepared the field and planted the corn in a little less than half a day where it took us better than a week to plant the other 60 acres.

Approximately 55 acres of milo was planted on the lowest fields in hopes of being able to flood it during the fall. The milo was planted by broadcasting followed by a light disking. We got a little mixed up on the seeding rate and some fields were planted at the rate of 50 lb./acre with the lowest 20 lb./acre. Needless to say, it was very thick and production was likely hampered on this account. However, yield again was better than expected averaging 45 bushel/acre. The seed ripened very late well into October. The seed was obtained from Swan Lake NWR.

Forty acres of Japanese millet was planted by broadcasting in two moist soil areas. Yield averaged approximately 1,217 lbs./acre.

Forty acres of buckwheat was planted by broadcasting on one moist soil area and selected low fields. Weed competition nearly overtook these plantings and no attempt to measure yields was made.

Fifty-four acres of a clover mixture was planted in strips adjacent to the corn strips as a future rotation crop. The mixture consisted of red clover, ladino clover and alsike clover. The clover was planted by contract with an oats nurse crop. The dry conditions fried the plantings on Fields 9 & 10 but good stands were obtained on Field 18. It was hoped the clover would also serve as additional goose browse during the early fall.



Strip farming of Fields 9 and 10...Fox Pond, Little Fox Pond and Mississippi at top of photo.
9/30/87

JC

One hundred acres of winter wheat was planted by contract in strips adjacent to corn as goose browse. Sweet clover was planted along with the wheat to provide additional plowdown benefit the following spring. Geese used the winter wheat extensively as usual and by December all was gone except for the sweet clover.

Spring DNC seed downs on Fields 7, 10, 14 and 15 were done under contract. Success was marginal with 7 and 10 total failures. The seed downs will be redone in 1988. Fall seed downs were done by force account on Fields 21, 22 and 25.

- Wildlife use on croplands was very good. Waterfowl, especially geese, used corn, milo, Japanese millet and winter wheat plantings extensively throughout the fall. It was necessary to knock down some of the milo since we were unable to flood any of it with the exception of M.S. 9. Geese loved the mowed milo and use was very heavy on Fields 5 and 17. Pheasants and deer made use of the milo throughout the fall as cover and food. Little use was observed on buckwheat. This crop is generally utilized extensively by geese on Louisa but the weed competition influenced use this year. Waterfowl use of corn was impressive with







LOUISA DIVISION

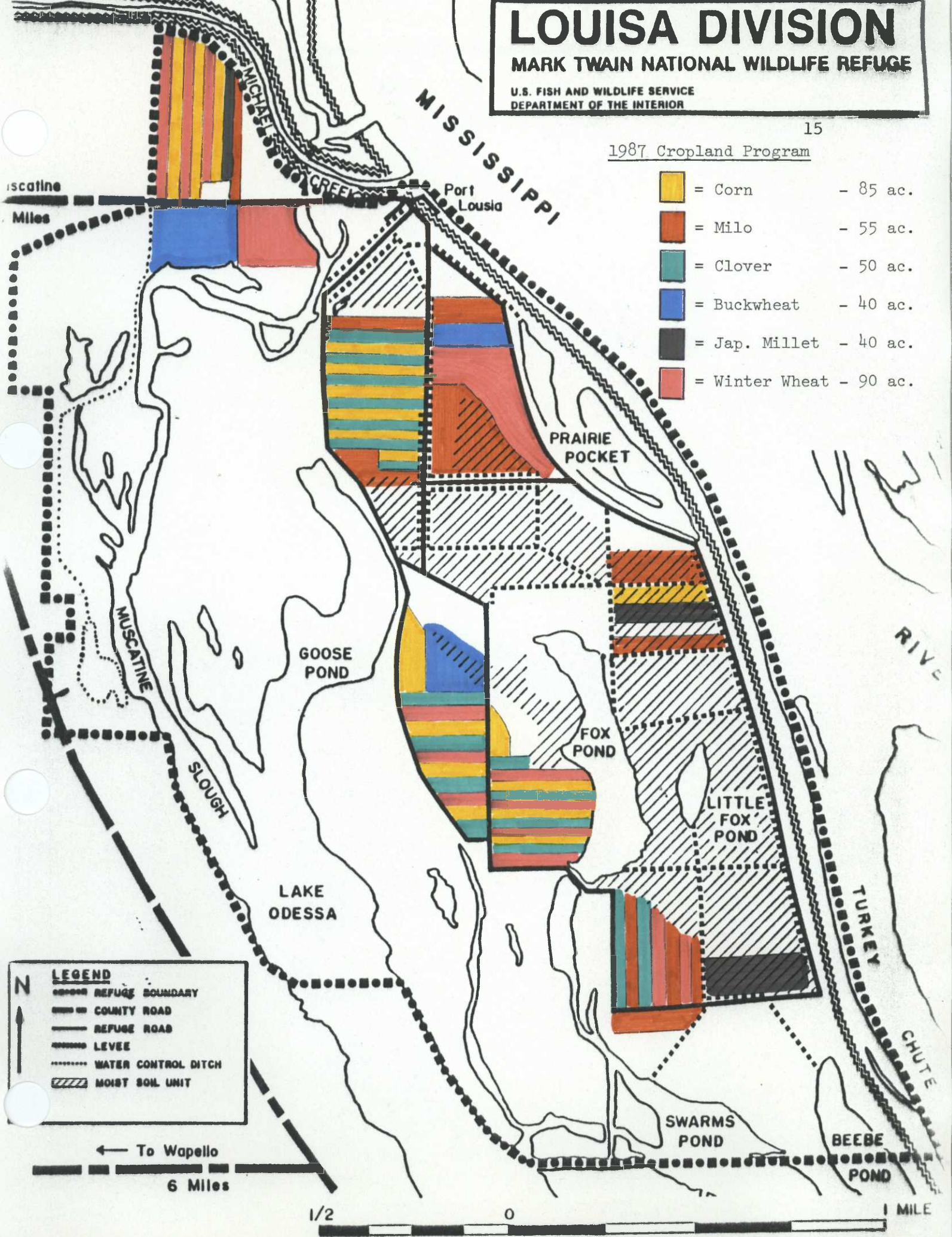
MARK TWAIN NATIONAL WILDLIFE REFUGE

U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

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1987 Cropland Program

	= Corn	- 85 ac.
	= Milo	- 55 ac.
	= Clover	- 50 ac.
	= Buckwheat	- 40 ac.
	= Jap. Millet	- 40 ac.
	= Winter Wheat	- 90 ac.



Fields 9 and 10 nearly 100% consumed prior to November. Both ducks and geese used Fields 18 and 26 extensively in late fall with an estimated 7,000 ducks and 2,000 geese on Field 26 in one afternoon. Japanese millet was hit hard by blackbirds in early fall making it appear as though the stands had been entirely consumed. In reality the blackbirds knock down more than they consume and when the moist soil areas were flooded, geese and ducks used the areas extensively. Deer made extensive use of corn fields throughout the winter. Up to 50 deer were observed regularly utilizing Field 18. Pheasants made extensive use of the corn and milo on Field 26 during the winter. Over 40 birds were observed in late November.

DNC seed downs on Fields 21, 22 and 25 were accomplished in mid-August. The DNC mix consisted of:

Alfalfa - 6 lbs. bulk/acre
 Red Clover - 2 lbs. bulk/acre
 Ladino Clover - 1 lb. bulk/acre
 Alsike Clover - 1 lb. bulk/acre
 Sweet Clover - 1 lb. bulk/acre
 Orchard Grass - 3 lbs. bulk/acre

Seeding was done with a cyclone seeder operated on a 3-wheel ATV. The seed was covered with a drag. Response prior to freeze-up was good and a 5-inch rain two weeks after planting helped the seedings along.

5. Grasslands

The 1985 native grass seed down on the sand ridge finally showed promise of developing a stand. Big bluestem and Indian grass was scattered throughout the field.

Other native plantings were in good shape except the plot adjacent to the headquarters. This plot is a disappointment as it is prone to severe lodging during the winter with even the slightest snowfall. In the spring the area provides little cover for nesting species.

8. Haying

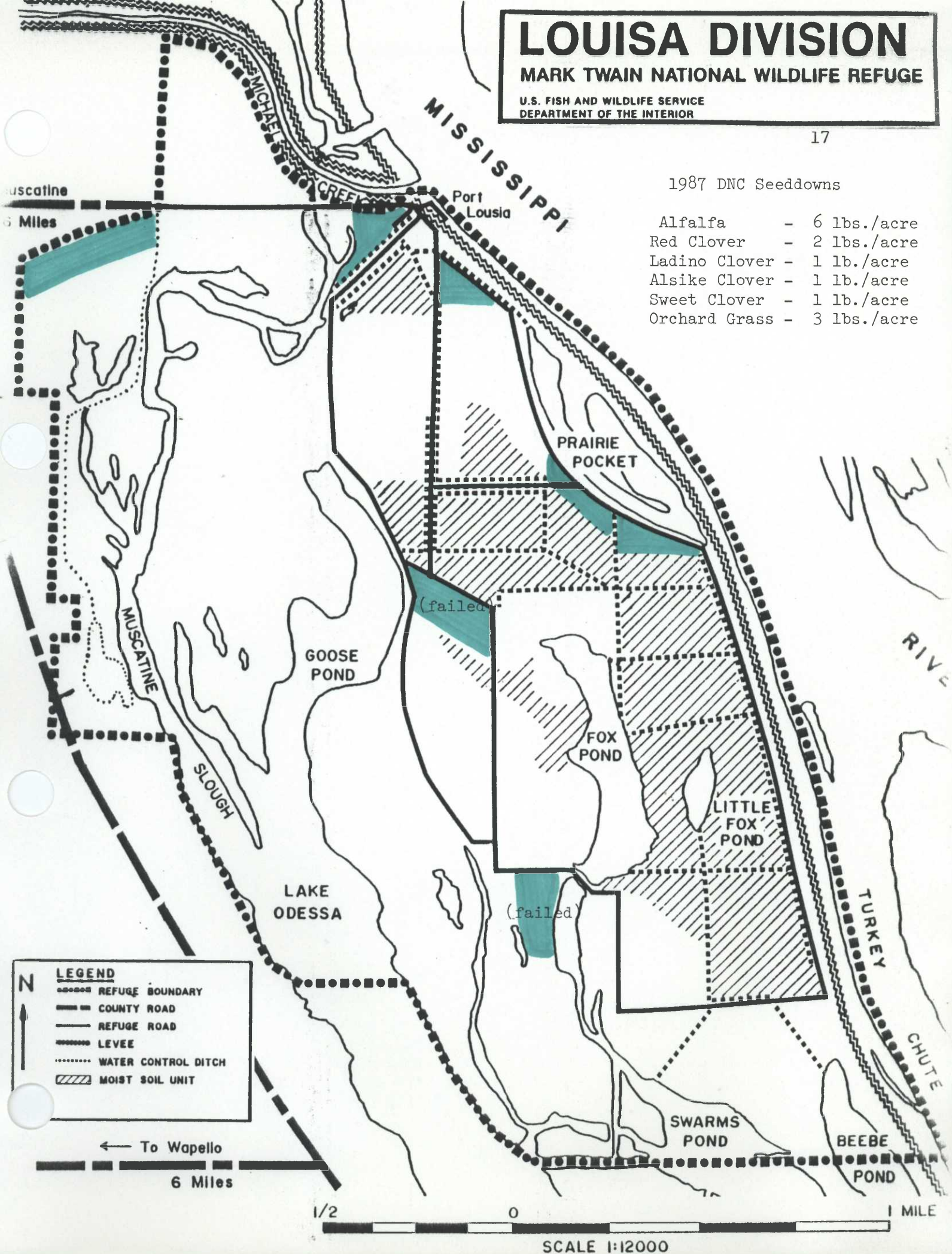
Fields 29 and 30 were hayed to improve the initial seed down of DNC on these two fields and to control insect damage. Haying was completed on June 1 and July 20. June 1 is a little early for our liking, but nest dragging on the fields revealed no nesting on the fields. A total of 41 tons of hay was removed from the fields. Periodic haying will be used on DNC fields to maintain vigor of the stands. A haying plan will be prepared prior to the 1988 season.

Due to the summer drought, hay was in very short supply in the private sector. Emergency haying of set-aside acres was permitted in the

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Alfalfa	-	6 lbs./acre
Red Clover	-	2 lbs./acre
Ladino Clover	-	1 lb./acre
Alsike Clover	-	1 lb./acre
Sweet Clover	-	1 lb./acre
Orchard Grass	-	3 lbs./acre



county. Nearly every farmer in the local area was haying the set-aside and most had no need for the hay.

9. Fire Management

The '87 prescribed burning plan included seven units totalling 142 acres.

1987 Prescribed Burning

<u>Unit</u>	<u>Vegetation</u>	<u>Date</u>	<u>Temp.</u>	<u>Humid.</u>	<u>Wind</u>	<u>Method</u>	<u>Acres</u>	<u>Cost</u>
Louisa 1	Cool Season	4/10/87	60	40%	SE10	Back	10	12.00
Louisa 2	Native Grass	4/10/87	60	40%	SE10	Head	5	4.00
Louisa 4	Native Grass	4/10/87	60	40%	SE10	Head	28	1.79
Keithsburg 1	Cool Season	4/10/87	60	40%	SE10	Back	5	10.00

Louisa 2 consists of a native grass seed down with serious brush invasion. This year's burn hammered invading willows and even killed large willows on the east side of the unit.

The remainder of the units and acreage could not be completed due to unfavorable weather conditions and early green up.

We had planned to attempt a fall burn in late November to control brush on Field 2. However, rain set in and even December turned out to be one of the wettest on record so the burn was not attempted.

10. Pest Control

In 1987 Iowa passed a new groundwater protection law and with it annual pesticides applicator testing and continuing education (8 hours) was required beginning in 1988. The new testing proves to be quite difficult as the maintenance mechanic and the assistant manager failed to pass one of the sections of the test on the first attempt. They were not alone, however, as numerous other DNR, DOT and commercial people also struck out. Hopefully, we'll be able to have certified personnel for 1988.

No pesticides were used on the refuge in 1987.

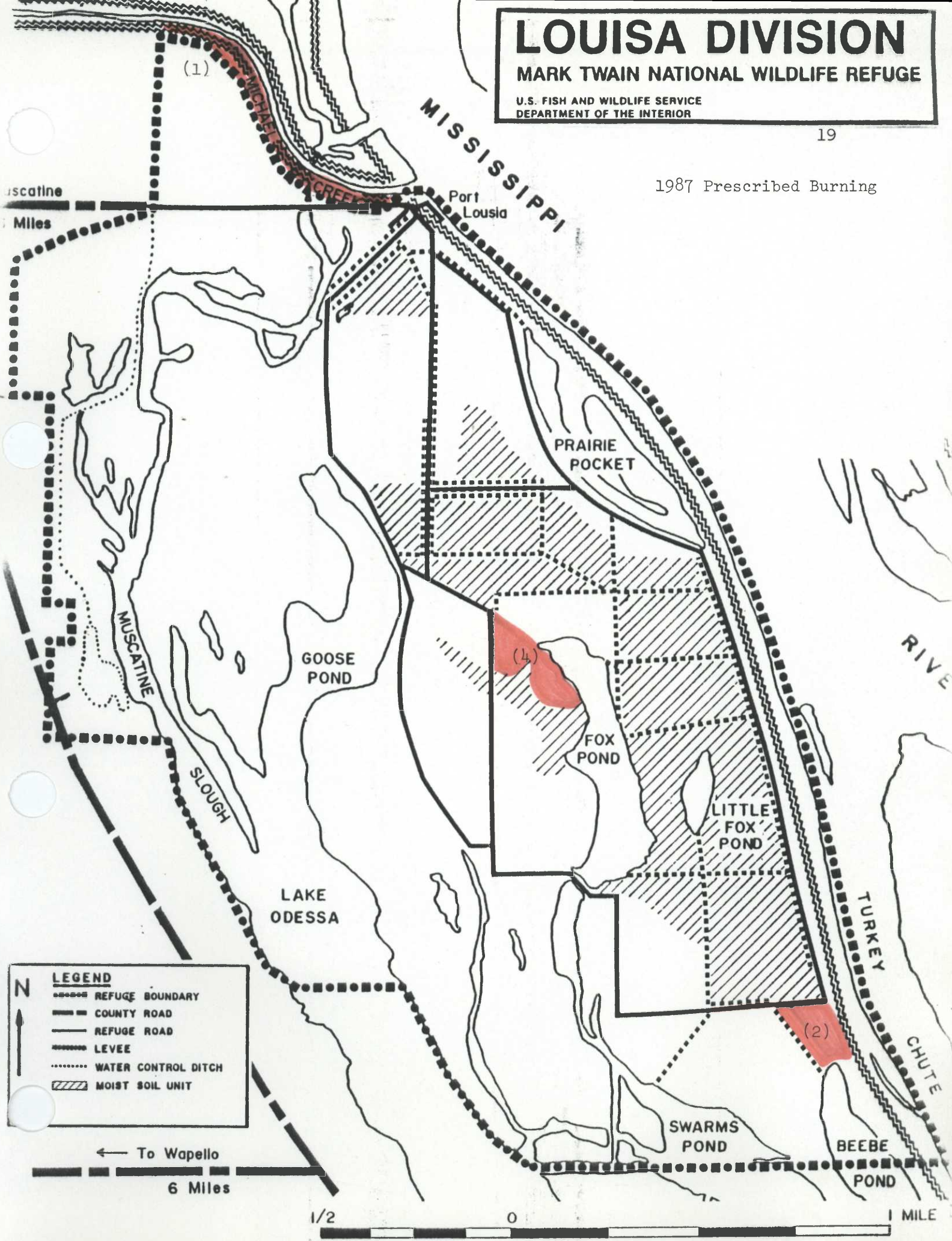
LOUISA DIVISION

MARK TWAIN NATIONAL WILDLIFE REFUGE

U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

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1987 Prescribed Burning



G. WILDLIFE2. Endangered and/or Threatened Species

The refuge attracts wintering bald eagles and migrating peregrine falcons.

	<u>Peak Population</u>	<u>Month</u>	<u>Use Days</u>
Bald Eagle	28	February	1,260
American Peregrine Falcon	2	January	75

The annual mid-winter eagle census was run January 12 recording 35 adults, 12 immatures and 3 unknown.

The fall peak population of eagles on the refuge averages 20-25 birds but only 7 were observed this fall. The lack of open river water next to the refuge during December was a factor. At the same time, large concentrations were being reported around Lock and Dam 18--up to 80 birds.

3. WaterfowlWaterfowl Production

Production estimates are based primarily on spring breeding pair counts and brood observations made in conjunction with other field work. We did not have the luxury of monitoring brood progress on a daily basis as in past years. Supervision of the YCC crew (1 enrollee) left the staff very short handed. We agree that breeding pair counts are a better estimating guide than brood counts, but it is nice to have that supporting documentation (brood counts).

As stated elsewhere, the moist soil draw down began March 9, so by the time broods began hatching in mid-May, brood habitat was limited to Muscatine Slough, ditches, and Little Fox Pond.

The spring mallard pair count was relatively high (estimated 52.5 pair) but few mallard broods were observed relative to the number of breeding pairs. Because of this, the mallard estimate is based on broods observed. Either they moved their broods to water off the refuge, nested elsewhere, were nonbreeders, or nesting success was atypically low. We feel we were seeing nonbreeders or they chose to nest elsewhere. Nesting habitat was good, but little brood habitat was available.

Five-Year Waterfowl Production Summary

	<u>Wood duck</u>	<u>Mallard</u>	<u>Blue-winged teal</u>	<u>Hooded Merganser</u>
1983	300	120	0	0
1984	400	20	0	0
1985	465	60	0	0
1986	628	52	0	50
1987	176	60	0	0

Look at 1986 and 1987, feast and then famine. The reason is a drastic change in habitat conditions. During 1986, the refuge was inundated with water beyond our capacity to control, and in 1987 we didn't have enough to control.

Seventeen waterfowl nesting baskets were constructed and installed in early spring by Volunteer Doug Schnoebelen. Mr. Schnoebelen purchased the materials, constructed the baskets, and installed them, an outstanding example of a conservation-minded sportsman who Takes Pride in America.



Volunteer Schnoebelen erecting
nest baskets.

3/87

CM

The baskets didn't attract any nesters. Our guess is a lack of a significant breeding population of upland nesters is the reason for the non-use.

Nest drags for upland nesting waterfowl were conducted May 7, 13, and 21 using 3-wheelers and 50 feet of 3/8-inch chain. One mallard nest was located on Field 27, May 7, with two eggs. It was later abandoned.

Waterfowl Populations

The spring migration occurred a little early this year and didn't last very long. Waterfowl populations peaked the third week in February with 3,100 geese and 4,520 ducks. The peak was down nearly 50% from 1986 and the average.

The fall migration began in mid-August with the arrival of teal and Canada geese. The goose population quickly built to 5,000 and remained at that level through September and mid-October. Canada geese peaked at 7,200 at the beginning of November. Duck populations built rapidly in October and peaked at 52,325 during the second week of November. Mallards, as usual, comprised the bulk of the population followed by wigeon, pintail and gadwall.

Canada geese normally establish feeding flights to private land west of the refuge during August and early September. This year those flights did not develop. We suspect the abundant food on the refuge along with the influence of transplanted geese was the reason. However, geese did



Goose use on Field 26--winter
wheat and corn stubble.

11/23/87

WS

begin leaving the refuge to feed during the second week of November and full-scale flights were established immediately after the close of the Iowa goose season. Geese were observed on feeding flights northwest of Columbus Junction approximately 30 miles from the refuge. On the refuge, geese made extensive use of winter wheat plantings and crop fields while almost totally ignoring moist soil areas. Snow geese peaked at 900 birds during the second week of November. White-fronts peaked at 60 birds in late October. As far as we were able to determine, the snows and white-fronts never ventured off the refuge until they departed in mid-December. While on the refuge they made almost exclusive use of wheat plantings.

Ducks followed a similar pattern. Feeding flights were delayed well into November. Ducks were a little more selective in the habitat chosen on the refuge. During the early fall, almost exclusive use of Fox Pond was the rule, but as water levels increased use declined steadily. Birds then shifted to moist soil areas with M.S. 3, 4 and 5 receiving heavy use for about ten days. We were unable to determine if birds were feeding or loafing on these areas. M.S. 2, 6 and 7 were avoided like the plague, and use on M.S. 9 was minimal. M.S. 1 and 8 were used well but not until early November. Ducks hardly used crop fields except for the corn on Fields 10, 18 and 26 and little use was noted in milo plantings. In late November around 2,000 birds used the flooded buckwheat on Field 24. Evening roosting was confined nearly entirely to Muscatine Slough and the upper reaches of Goose Pond.

Approximately 550 geese and 200 mallards remained on the refuge at the close of the year with a large area of open water available on Goose Pond. Use for the year totalled 2,867,069 duck use days, down 24% from the long-term average, and 571,583 used days, up 33% from the long-term average.

Canada Goose Transplant

In 1986 Iowa DNR made a request to transplant giant Canada geese on Louisa. Permission was given stipulating Louisa could be used as a release site but our management would not be altered in favor of geese. The purpose of the release is to expand breeding populations within Iowa. Louisa was picked since it is a closed area in the fall and the DNR felt suitable nesting habitat was available. The DNR is banking on the geese returning to the area from which they fledged to breed. The geese were collected from Northwest Iowa in the vicinity of Turnbull Lake and Spirit Lake. One hundred thirty-seven giant Canada geese, 16 adults and 121 young, were released at Goose Pond on June 22. All were legbanded and 30 were neck collared to monitor the release/success. From observing neck collars, the group remained on the refuge until the end of the year. The DNR plans to release an additional 150 birds in 1988 and hope in a couple of years geese will be nesting in this part of the state.

1987 Peak Waterfowl Populations

	<u>Goose Population</u>			<u>Use Days</u>	<u>Duck Population</u>	
	<u>Canada</u>	<u>Snow</u>	<u>White-front</u>		<u>Population</u>	<u>Use Days</u>
January	1,500	0	0	18,600	1,042	8,835
February	3,100	10	0	51,016	4,520	39,340
March	230	0	4	2,511	1,155	19,282
April	10	0	0	60	1,005	8,640
May	4	0	0	124	480	7,192
June	150	0	0	1,200	260	4,500
July	150	0	0	3,410	325	10,075
August	300	0	0	3,410	1,000	14,105
September	5,000	0	0	60,000	8,050	61,050
October	6,600	600	60	190,950	43,395	908,300
November	7,200	900	50	208,475	52,325	1,569,750
December	2,750	300	10	<u>31,527</u>	18,000	<u>216,000</u>
	Total Use Days			Geese 571,583	Ducks	2,867,069

4. Marsh and Water Birds

Great blue herons are the most visibly dominant species in this category. Two rookeries are located close to Louisa and the birds utilize the refuge daily for feeding. Peak populations were recorded May and September at 35 birds each.

Great egrets, little blue heron, double crested cormorant, American bittern, cattle egret, black and yellow crowned night heron, green-backed heron, sora rails, and common gallinules were all present during the year. American coots were few and far between last spring. A peak of 8,400 was recorded in mid-October on Fox Pond and Little Goose Pond.

5. Shorebirds, Gulls, and Terns

With draw down beginning in March, most shorebird habitat had evaporated by the time the migration was here with one exception, Fox Pond. To maintain draw down conditions it was necessary to pump every 3-4 days throughout the spring and summer leaving ideal mudflat conditions. In mid-June an estimated peak of 3,400 were seen. The group, in descending order, was made up of greater and lesser yellowlegs, killdeer, pectoral sandpiper, snipe, least sandpiper, Wilson's phalarope and lesser golden plover. To our knowledge, the killdeer were the only nesting species.

6. Raptors

Rough-legged, red-tailed, broad-winged and red-shouldered hawks, osprey, bald eagle, peregrine falcon and northern harrier all visit, mostly during the fall and winter. The only residents are barred and great-horned owls. Barred are much more common with the great-horned seen rarely. Hawks appeared to have stayed in the area longer than prior years. We suspect this to be the result of the standing crops on the refuge as well as the abundant set-aside and Conservation Reserve ground in the area providing quality habitat.

7. Other Migratory Birds

Mourning doves congregated in September with a peak population estimate of 350. Red-headed and pileated woodpeckers were observed. Again this spring a yellow-headed blackbird was observed, but suspect it was just passing through. Snow buntings were present during January, 1987.

8. Game Mammals

The white-tailed deer population until December averaged approximately 30. Fawns were observed frequently throughout the summer with twins common. With the start of the hunting season in December, the refuge

population climbed to an estimated 130 deer. The deer population made extensive use of corn and milo plots throughout the month of December.



Deer in Field 10.
9/87 JG

Red fox and coyote populations remained low.

Beaver populations remained stable with an estimated three colonies on the refuge. They caused a little trouble this year in attempting to dam up ditch cleanout activities.

Cottontail rabbits experienced a boom year with rabbits observed everywhere and were especially abundant in and around milo plantings.

Squirrel numbers remained stable.

10. Other Resident Wildlife

- The mild winter coupled with the dry spring resulted in a comeback for the pheasant population. Six broods were observed throughout the summer with three of the broods in Field 24 planted to buckwheat. The fall population was estimated at 40 birds compared with two in 1986.

Quail made a similar comeback with small coveys observed on the refuge bottoms for the first time in many years.

Wild turkey populations on and around the refuge continue to increase. The refuge population is estimated at 30-40 birds with several long-beards.

11. Fisheries Resources



Commercial fishing at Fox Pond.
3/87 CM

One special use permit was issued for commercial fishing. Selection was accomplished by sealed bid competition. Season length was set at March 13 through August 31. The successful bid (three bids received) was for \$806.00. Because the refuge impoundments were being drawn down, the fish were more concentrated making a tough job a bit easier. We were amazed at the number of carp and buffalo removed from Fox Pond, a 60-acre impoundment. The sportfish and unwanted rough fish were returned or left on the bank accounting for another 7,000-10,000 pounds.

1987 Commercial Fishing

	<u>Fox Pond</u>	<u>Prairie Pocket</u>	<u>Swarms and Beebe Pond</u>
Carp	30,683 lbs.	1,188 lbs.	36 lbs.
Buffalo	<u>653</u> lbs.	<u>1,900</u> lbs.	<u>1,626</u> lbs.
Total	31,336 lbs.	3,088 lbs.	1,662 lbs.

On September 18, 1,500 largemouth bass fingerlings were stocked into Prairie Pocket by Fisheries Assistance Biologist Milligan from the Genoa Fish Hatchery at LaCrosse, Wisconsin.

15. Animal Control

Turtle Trapping

Two special use permits were issued for snapping turtle trapping.

<u>Permittee</u>	<u># Snapping Turtles</u>	<u>Total Pounds</u>
#1	98	980
#2	<u>3</u>	<u>61</u>
Totals	101	1,041

Furbearer Trapping

A special spring trapping season was requested from Iowa DNR in an effort to reduce damage to refuge dikes and roads. The season ran March 7 through April 12. Two permits were issued on a bid system with successful bids of \$256 (Zone 1) and \$378 (Zone 2). The season proved quite successful.

1987 Spring Trapping

Zone 1	509 muskrat
Zone 2	441 muskrat

Fall trapping was not nearly as successful. Due to the dry conditions, muskrats moved to better habitat along the river and Lake Odessa. Little damage to facilities was noted throughout the year and a decision was made to remove muskrats as a target species for the fall program. This left only raccoon and skunk as target species to be trapped. Interest in the program was, therefore, minimal with only one bid submitted for Zone 2. No bids were received for Zone 1. After four days without a catch, the trapper pulled out of the refuge the first week of December.

1987 Fall Trapping

	<u>Raccoon</u>	<u>Skunk</u>	<u>Opossum</u>	<u>Muskrat</u>	<u>Beaver</u>
Zone 1	0	0	0	Not Trapped	Not Trapped
Zone 2	27	9	42	Not Trapped	Not Trapped
Keithsburg	39	0	0	66	16

On December 10 an aerial muskrat hut census was made on Louisa. The following are the results for each zone.

<u>Zone 1</u>		<u>Zone 2</u>	
<u>Area</u>	<u># Huts</u>	<u>Area</u>	<u># Huts</u>
M.S. 1	3	None	
M.S. 2	3		
M.S. 3	5		
M.S. 4	31		
M.S. 5	34		
Fox Pond	4		
Swarms	1		

Hut construction was down approximately 61% from 1986. Again, we suspect this is due to the dry conditions experienced throughout the year.

16. Marking and Banding

During the Operational Inspection in June, the Canada goose banding quota was eliminated. For years the refuge staff had chased the geese from one site to another with little success. Everyone agreed that attempting to band from a population peaking at less than 10,000 birds on 2,300 acres of habitat was not practical.

Neck collar observations are still recorded for the fall migration. The goal is 600 Canada goose neck collar observations. The goal was exceeded this year with a total of 1,277 observations made on 222 individual collars.

H. PUBLIC USE

1. General

Since over 90% of the public use on the refuge comes as sport fishing, 1987 was not a good year. With the draw down of Lake Odessa, boat access to the refuge was severely limited and bank fishing nearly impossible.

The refuge closes to public use annually with the start of the Iowa waterfowl hunting season which was September 19 this year.

Media exposure increased this year. Muscatine cable TV did a 20 minute program on management of the refuge. Channel 8 TV out of Davenport did a lengthy spot on the self-guided auto tours. The staff was featured on two radio talk shows. Local newspapers ran each news release prepared from the refuge.

Work commenced on preparation of general leaflets for each (3) division of the District. The leaflets should be completed early in 1988 and should greatly benefit our overall program.

2. Outdoor Classrooms - Students

The annual Louisa County Conservation Day was held in May again this year. The day is for all 6th grade students in the county and a wide variety of outdoor topics are presented to each class. Assistant Manager McCarty presented a program on goose banding during the day. A total of 8 groups encompassing 219 students was present.

Three community college natural resources classes from Muscatine, Cedar Rapids and Knoxville, Illinois, utilized the refuge for outdoor studies (75 students).

4. Interpretive Foot Trails

The refuge has a .75 mile hiking trail beginning and ending at the river bluff overlook/headquarters. Occasionally a group will visit and hike together, but typically it is enjoyed by a few at a time.

5. Interpretive Tour Routes

For several years we debated bringing back self-guided auto tours to the refuge on one or two weekends during the fall migration. Auto tours had been permitted back in the early '70's but were discontinued due to lack



The tour route was a little crowded on occasion.
11/15/87

WS

of personnel and overcrowding on the route. We set up a self-guided tour route covering six miles of the refuge with eight interpretive stops. The tours were held on the weekends of 11/14 and 11/28. A total of 1,465 vehicles went through the refuge with an estimated 5,016 visitors. The total would have been much higher had it not been for very rainy weather on the second weekend. Two volunteers provided assistance with the tours guiding traffic and distributing leaflet materials.

Wildlife disturbance was minimal and visitors reported seeing a wide variety of wildlife including eagles, deer, fox, ducks and geese.

6. Interpretive Exhibits/Demonstrations

Overlooking the refuge at the bluff edge is an observation deck and interpretive exhibit discussing refuge management. Just about every visitor stopping goes to the observation deck with a few venturing on to the hiking trail.

8. Hunting

Hunting is not permitted on Louisa. However, intensive hunting activity occurs on every boundary. On the south the Iowa DNR manages a waterfowl hunting program on Lake Odessa. On the west private agricultural lands are hunted primarily for waterfowl. The north end is a combination of private ag land and wood lots hunted for turkey, deer, squirrel and waterfowl. The Mississippi River on the east is lined with waterfowl hunting blinds, 17 this year, just offshore from the refuge.

Waterfowl hunting on the Iowa DNR Lake Odessa Wildlife Area improved dramatically over the record low year of 1986. The total harvest increased over 1,000% from 1986 with wood duck, mallard and teal comprising the bulk of the take. The goose harvest, however, decreased by an estimated 50% from 1986. Goose hunting on private land around the refuge fared little better. The geese simply failed to set up off refuge feeding flights and remained almost entirely on the refuge from September - December. Normally, on the opening weekend of the season, an estimated 3-400 geese are taken on private land around the refuge. This year we know of only three geese taken on the opening weekend. One landowner, on learning of the Iowa DNR's transplanted geese on the refuge, closed his land to goose hunting this year.

9. Fishing

Sport fishing is a major public use attraction on the refuge. Even when the refuge is closed to public use, fishing is permitted at the inlet diversion ditch. Fishing activity fell off during the hot, dry summer except for a brief period when the inlet tubes were opened to flush water through Lake Odessa. Fall activity was very light.

10. Trapping

Furbearer trapping is covered in Section G.15.

11. Wildlife Observation

This activity increased this year primarily due to the crops planted along the Port Louisa entrance road. The crops drew large flocks of ducks and geese. In addition, a number of deer and pheasants used the fields as well. This provided visitors with an opportunity to view wildlife at close range.

16. Other Non-Wildlife Oriented Recreation

Mushroom, nut and berry picking is permitted, but there was little interest unlike last year. There was little to be had once again due to dry conditions.

17. Law Enforcement

Enforcement activities are limited primarily to hunting season openers and peak waterfowl periods on the refuge. Formal/scheduled patrols are not conducted at other times of the year, but regulations are enforced in conjunction with other activities. Excellent cooperation exists with Iowa DNR Conservation Officers and local authorities. Iowa CO's made several cases on Louisa and Big Timber during the year with the majority involving fishing and boating.

The following summarizes LE activities during 1987.

1987 LE Cases

<u>Date</u>	<u>Location</u>	<u>Violation</u>	<u>Disposition</u>	<u>Fine</u>
1/04/87	Louisa	Interfere w/person engaged in activity	FOC - 2	\$ 400
		Trespass in closed area	FOC - 1	\$ 50
2/04/87	Louisa	Unauthorized use of firearms	FOC - 2	\$ 200
3/04/87	Louisa	Unauthorized parking	FOC - 1	\$ 25
		Fishing without state license	FOC - 1	\$ 100
3/18/87	Louisa	Violation of Special Use Permit	FOC - 1	\$ 50
		Commercial fishing - unlicensed helper	FOC - 1	\$ 50
9/19/87	Big Timber	Unplugged gun	FOC - 1	\$ 75
9/20/87	Big Timber	Lead shot	FOC - 1	\$ 75
9/27/87	Louisa	Trespass in closed area	FOC - 1	\$ 50
10/02/87	Louisa	Length limit on largemouth bass	FOC - 1	\$ 148.75
	Louisa	Daily limit on largemouth bass	FOC - 1	\$ 135
10/03/87	Louisa	Leadshot	FOC - 1	\$ 75
10/24/87	Louisa	Leadshot	FOC - 2	\$ 150
	Big Timber	Leadshot	FOC - 1	\$ 75
	Big Timber	Unplugged gun	FOC - 1	\$ 50
	Big Timber	No federal duck stamp	FOC - 1	\$ 50
12/12/87	Keithsburg	Unauthorized possession of firearm	Pending - 1	\$ 100
	Keithsburg	Trespass in closed area	Pending - 1	\$ 50
			22	\$1908.75

Fish and Wildlife Service
Division of Wildlife Refuges

PUBLIC USE REPORT

33

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Organization
Number

Name

Report
Period
Yr Mo

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
3	0	1	0	3	3	6	3	1	0	0	L	S	A			

OUTPUT TYPE

LINE CODE

NO.
VISITS

ACTIVITY
HOURS

NON-STD
TOT. REH.

18 19 20 21 22 23 24 25 26 27-35 36-45 46-55

INTERPRETATION

Wildlife Trails - Nonmotorized

Self Guided

Conducted

Wildlife Tour Routes - Motorized

Self Guided

Conducted

Interpretive Center

Visitor Contact Station

Interpretive Exhibits - Demonstra

Self Guided

Conducted

Other On-Refuge Programs

ENVIRONMENTAL EDUCATION

Students

Teachers

RECREATION-WILDLIFE CONSUMPTIVE

Hunting Mig. Birds - Waterfowl

Ducks

Geese

Swans

General Waterfowl

Hunting Mig. Birds - Other

TOTAL TOTALS

Region 3

Station

Louisa

Date Prepared

1987

Form 3-239a

Rev. 12/75

Name

PUBLIC USE REPORT 34

TE Code				Organization Number					Name				Report Period		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Yr	Mo
3	0	1	0	3	3	6	3	1	0	0	L	S	A		

Page 2 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	NON-STD TOT. REU
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE CONSUMPTIVE (c't)													
Hunting Resident Game													
Upland Game Birds	2	1	1	0	0	0	0	P	L				
Big Game				(Species Code)									
Deer - Gun	2	1	2					P	H				
Deer - Bow	2	1	3					P	J				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
Small Game	2	1	5	0	0	0	0	P	Z				
Other Game	2	1	6	0	0	0	0	P	U				
Trapping	2	1	7	0	0	0	0	U	G	177	882		
Fishing													
Warmwater	2	2	1	0	0	0	0	U	W	4350	9400		
Coldwater	2	2	2	0	0	0	0	U	C				
Saltwater	2	2	3	0	0	0	0	U	S				
Clams, Crabs, Oysters, Frogs	2	2	4	0	0	0	0	U	Y				
Other Consumptive Wildl. Rec.	2	3	0	0	0	0	0	U	M				
RECREATION-WILDLIFE NON-CONSUMPTIVE													
Camping	3	0	0	0	0	0	0	U	H				
Picnicking	3	1	0	0	0	0	0	U	B				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	4527	10282		

TR Code				Organization Number					Name				Report Period			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Yr	Mo	
3	0	1	0	3	3	6	3	1	0	0	L	S	A			

PUBLIC USE REPORT 35

Page 3 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	OUTPUT UNITS	NON-STD TOT. REU
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE NON-CONSUMPTIVE												Act. Hr.	
Wildlife/Wildlands Observation													
Foot	3	2	1	0	0	0	0	U	E	205	485		
Land Vehicle	3	2	2	0	0	0	0	U	N	50	50		
Boat	3	2	3	0	0	0	0	U	L	30	55		
Other	3	2	4	0	0	0	0	U	P				
Photography	3	3	0	0	0	0	0	U	T	47	168		
Field Trials	3	4	0	0	0	0	0	U	X				
RECREATION - NON-WILDLIFE													
Camping	4	0	0	0	0	0	0	R	C				
Picnicking	4	1	0	0	0	0	0	R	P				
Swimming	4	2	0	0	0	0	0	R	S				
Boating	4	3	0	0	0	0	0	R	B				
Waterskiing	4	4	0	0	0	0	0	R	W				
Off Road Vehicling	4	5	0	0	0	0	0	R	V				
Other	4	6	0	0	0	0	0	R	M	25	50		
TOTAL VISITS TO REFUGE	0	9	0	0	0	0	0	P	V	15381			
FISH & WILDLIFE INFORMATION												Per. Sara	
Public Inquiries	5	0	1	0	0	0	0	F	P		250		
News Releases	5	0	2	0	0	0	0	F	N		11		
Personal Appearances	5	0	3	0	0	0	0	F	A		6		
Professional Services	5	0	4	0	0	0	0	F	S				
Exhibits	5	0	5	0	0	0	0	F	E				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	15738	1075		

Region 3 Station Louisa Date Prepared 1987

Name

Numerous warnings were also issued during the year including trespass, unauthorized barge mooring, unauthorized parking, etc.

The 12/12/87 violation involved suspected deer poaching on Keithsburg. Illinois DOC Officers on a tip confiscated a pickup and rifle from an individual but had to drop charges due to lack of evidence. When contacted by the refuge, the individual admitted being on the closed refuge with a 25-06 rifle. At least two deer that had been shot and left on the refuge were also found later. The individual was a convicted felon and at last report had skipped to Florida. We doubt the fines for refuge violations will be collected.

Stanley and McCarty attended LE refresher training at Springfield, Illinois, in April and requalified with the service revolver at Springfield in September.

McCarty assisted Clarence Cannon NWR with their controlled deer bow hunt on Gardner in October.

I. EQUIPMENT AND FACILITIES

1. New Construction



New Shop Completed.
7/87 WS

Contract No: 14-16-0003-86-086 - Maintenance Building - The new refuge shop on which construction commenced in 1986 was completed in June with the final staining of the exterior. The building was completed with few problems encountered. Installation of the vehicle hoist proved to be the most difficult. An error in laying out the pit resulted in the

hoist being incapable of handling vehicles with a short wheelbase such as a Ford Ranger or a Chevy S-10 pickup. Also, the pit was prone to collecting seep water following heavy rains and it was necessary to install a sump pump in the pit. Problems were encountered in sealing the concrete floor and the muriatic acid actually "burned" the concrete creating large stained areas. We required the contractor to do the job over using a colored (grey) sealer and the floor turned out great.

The new facility has turned out to be an excellent addition to the refuge. We've encountered no problems during the first year and utility bills seem to be very reasonable.

Contract No: 14-16-0003-87-065 - Fox Pond Fuel Containment: The project involved the construction of a containment facility to protect against spills in the event of problems with the free standing fuel tank (550 gallons) at the Fox Pond pumping station. EN designed a concrete containment box atop which sets the fuel tank. The contract was awarded to Hawkeye Contractors, Muscatine, Iowa, at a cost of \$4,608. The project was completed 6/19/87 with no problems encountered. The refuge re-routed fuel lines and added additional rip-rap around the structure once it was completed.



Prior to project, fuel tank sat next to pump engine. Note containment box beneath fuel tank.

8/87

WS

2. Rehabilitation

ARMM

The contract for construction of the new shop included only one coat of stain for the exterior of the building. A contract was awarded to give the building a second coat of stain along with the overlook structure at the headquarters. Total cost of the project was \$1,900.

The concrete slab next to the storage building was extended to the new shop to provide an area for washing vehicles and equipment. The area also serves as a place to store equipment trailers and other equipment. The project was completed by contract at a cost of \$2,100.

Protective railings and steel bar grating walkways were constructed on Fox Pond control and the diversion structure. The project was completed for an account at a cost of \$1,000. The project has resulted in much safer operations during stoplog manipulations and for the public who fish from the diversion structure regularly.



Walkway and handrail construction
at Diversion Structure.

10/87

CM

Five drain culverts were removed from the Port Louisa road and a new 24-inch half-moon riser was installed in order to hold water for a greater period of time on Field 26 during the spring migration. The project was completed by contract at a cost of \$750.

A drain culvert was removed from the Muscatine Slough crossing and replaced with an 18-inch slide gate structure. This will allow us to hold water on about 25-30 acres of habitat during draw down periods on Lake Odessa. This will provide needed habitat for wood duck broods

during the draw down periods. The project was completed by contract at a cost of \$300.



New control structure at Muscatine Slough.
8/87 CM

Muskrat damage and high water damage from the 1986 flood were repaired on M.S. 1 and M.S. 8 dikes. The projects were completed by contract at a total cost of \$2,000.



Dike/road repair on M.S. 8 with M.S. 8 on
right and Little Goose Pond on left.
8/87 WS

The outlet structure on M.S. 8 had corroded off of the CMP under the center road. The CMP and structure were replaced with an 18-inch slide gate. The project was completed by contract at a cost of \$300.

Fifty-four acres of DNC was planted on Fields 7, 10, 14 and 15. The seed downs were completed by contract with the refuge furnishing the seed. An additional 50 acres of clover mixture was planted by contract as a rotation crop on selected crop fields.

Approximately 80 acres of moist soil habitat was manipulated via custom farming. Manipulation consisted of heavy or light discing on M.S. 2, 5, 9 and 10 prior to June 1.

DNC was purchased and planted by force account in the fall on Fields 21, 22 and 25. Total cost of the project was \$1,500.

The main hydraulic pump in the Terrain King mower was replaced after the original pump burned out after 200 hours of operation. Shortly after, the replacement pump also failed. Total costs were \$3,500.

Miscellaneous parts were replaced and repairs made on the John Deere 2640 to take care of overheating problems. The repairs were made force account - \$800.

\$3,000 was expended on refuge vehicles on miscellaneous parts and repairs such as tires, batteries, filters, etc.

Approximately 2.0 miles of ditches were cleaned by contract. Completed were the drains on M.S. 2, 3, 4 and Little Fox Pond. The drain on M.S. 4 and Little Fox Pond had not been cleaned in over 20 years. The total cost of the contract was \$2,500.



Ditch cleanout on Little Fox Pond.
8/87

WS

\$800 was expended on the new shop including protective wainscoting on the interior and materials for the overhead storage area.

\$1,100 was expended for pumping operations at Fox Pond associated with moist soil management and ditch cleanout and dike repair projects.

Two hundred fifty ton of road rock was applied to selected refuge roads following the completion of ARMM projects. The rock was delivered and end-gate spread under contract - \$1,960.

P.O. 30181-01286, FY86 - Powerline Removal (RPRP): Initially described in the 1986 Narrative, this project was completed in early 1987. Approximately 1.7 miles of overhead powerline was removed from the refuge. The entire line was relocated on private land north of the refuge boundary and over half of the line was put underground.

4. Equipment Utilization and Replacement

An end of a productive era came in August when the Bantam truck-mounted crane and the D-7 dozer were transferred to the State of Iowa. These two pieces of equipment served the refuge well since the mid-60's, but were deemed safety hazards during the operational inspection in June. We were instructed to park the equipment and survey it. We have no indication if/when the equipment will be replaced. The crane was the most valuable (in terms of versatility) piece of equipment we had and is sorely missed. Many operations were dependent on the machine and productivity will suffer when it comes to routine tasks such as moving/loading materials and equipment, cleaning control structures, clearing beaver dams, cleaning ditches, etc.

The electric pumping station at Keithsburg was not operated during the year. The electrical service was reconnected in preparation for the levee rehab. project.

The Chevy 1/2 ton pickup gave us headaches throughout the year. The truck was in and out of the repair shop continually with little improvement made each time. The vehicle is scheduled for replacement in FY88 with a 4 x 4 1/2 ton.

Both tractors were operated over 200 hours each in the cropland program and mowing regimen associated with roads, dikes and croplands. The John Deere 2640 tractor is due for replacement with a larger tractor capable of handling larger mowers and working in moist soil areas.

6. Energy Conservation

The station's fuel allocation for the year was 4,100 gallons. We used 81% of the total allotment. Electrical and propane consumption increased in FY87 due to the new shop.

	<u>Energy Use</u>				
	<u>FY87</u>	<u>FY86</u>	<u>FY85</u>	<u>FY84</u>	<u>FY83</u>
Gasoline	1,951	1,756	1,915	1,318	1,659
Diesel	1,371	988	1,966	970	755
Electricity (KWH)	21,621	17,287	22,353	21,307	18,843
Propane	1,160	1,100	1,800	1,400	1,230

An additional 1,460 gallons of diesel fuel were utilized in pumping operations associated with moist soil and habitat projects.

Fuel economy within the refuge vehicle fleet remains a little poor at 11.5 mpg for the three vehicle fleet.

J. OTHER ITEMS

1. Cooperative Programs

The refuge participated in several cooperative programs during the year:

--Dredge spoil on-site inspection team	Staff
--UMRCC Wildlife Technical Section	Staff
--Canada goose neck collar observations	Staff and Land
--Canada goose transplant - Iowa DNR	Land
--Farm bill	Staff
--COE Forest Management	Staff
--COE ROW and Permit Application review	Staff
--Louisa County Resource Area	Staff
--EMP	Staff and Land

2. Items of Interest

Maintenance Mechanic McNeil received a monetary special achievement award for his work as inspector on the new shop building and completion of the cropland program.

3. Credits

McCarty - Sections B; E.2, 6; F. 2; G.; H.
Stanley - All other sections.
Jack - Computerizing and assembly.

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E. ADMINISTRATION

2. Youth Programs

YCC activities on the refuge were limited to mowing, trimming, litter pick up, and parking lot maintenance with the Assistant Manager.

8. Other Items

EMP - Iowa DNR fisheries section has proposed a habitat rehabilitation project to improve the fishery on Big Timber. The original proposal involved the dredging of additional deep holes (20-30') in Coolegar Slough to provide additional overwintering habitat. However, an on-site meeting with COE representatives revealed the amount of work proposed could not be done with the estimated funds available. The project was then revised to include dredging of a deep water channel through the interior sloughs on the refuge with the channel to be roughly 30' w x 9' d. Several alternatives for disposing of the resulting spoil are being considered and include private land, use of abandoned crop fields on the refuge, and/or on-site disposal which would require clear cutting approximately 20-30 acres of timber and construction of containment dikes/berms.

At the same time, COE is proceeding with a long-standing project to upgrade the Muscatine Island levee which entails improving the levee to a 200 year flood capability. COE is investigating taking material for the levee project from Coolegar Slough again via deep holes (20-30'). Funding is uncertain for this project although COE reps think it will go through in a couple of years.

We will have two important questions to answer in 1988:

1. How much deep water habitat on Big Timber do we want and need?
2. How to dispose of the spoil?

F. HABITAT MANAGEMENT

2. Wetlands

Big Timber does not have any managed wetlands. The refuge is a back-water area of the Mississippi River managed by Mother Nature. Not having any flooding during 1987, conditions were very stable. If anything, low water levels had more influence than other environmental factors allowing moist soil plant production on exposed shoreline and allowing increased water temperatures in the many shallow areas.

G. WILDLIFE2. Endangered and/or Threatened Species

	<u>Peak Population</u>	<u>Month</u>	<u>Total Use Days</u>
Bald eagle	18	February	930
American Peregrine Falcon	1	September	10

3. Waterfowl

Waterfowl production estimates are based on casual observations. Because of the nature of Big Timber, breeding pair and brood censusing are unreliable, inefficient, and very labor intensive.

Five-Year Waterfowl Production Summary

	<u>Wood duck</u>	<u>Mallard</u>
1983	300	80
1984	225	0
1985	165	0
1986	220	20
1987	350	50

Waterfowl populations are estimated using the Illinois Natural History Survey flight data and casual observations.

4. Marsh and Water Birds

Great blue heron and great egret used the refuge extensively spring through fall. The low, stable river levels provided excellent feeding areas the whole period.

8. Game Mammals

White-tailed deer populations fluctuate seasonally on Big Timber and the associated islands. Populations remain low, however, due to the extensive public use on the area and hunting pressure. We suspect deer move to the Big Sand Mound Nature Preserve at the north end of the refuge when hunting seasons start. Deer on Turkey and Otter Islands move to the Louisa Refuge. Populations are estimated at 15 deer on Big Timber and 5 on Turkey and Otter Islands.

Squirrel, rabbit, muskrat, beaver and raccoon populations all remained stable.

1987 Waterfowl Populations

	<u>Geese</u>			<u>Ducks</u>	
	<u>Canada</u>	<u>Snow</u>	<u>Use Days</u>	<u>Population</u>	<u>Use Days</u>
January	0	0	0	0	0
February	0	0	0	1,890	14,645
March	0	0	0	820	6,882
April	0	0	0	485	3,510
May	0	0	0	380	6,750
June	0	0	0	185	3,600
July	0	0	0	315	6,510
August	0	0	0	265	4,557
September	0	0	0	2,475	43,950
October	250	75	3,875	4,095	74,245
November	925	175	16,230	2,915	62,940
December	0	0	<u>0</u>	2,210	<u>35,557</u>
Total Use Days Geese			20,105	Ducks	263,146

11. Fisheries Resources

The refuge is intensively monitored by Iowa DNR personnel since it receives some of the highest fishing use in the state. The DNR has been studying largemouth bass behavior for several years with emphasis on spawning habitat and wintering areas. Numerous bass have been radio tagged during the studies.



Iowa DNR Fisheries Biologists implanting radio transmitter.
8/87 CM

Population sampling was conducted by Fisheries Assistance Biologist Jim Milligan with the assistance of Iowa DNR personnel. The information collected is to be used in preparing a Fisheries Management Plan for the refuge.

H. PUBLIC USE

1. General

- The refuge is open to public use year round. Hunting and fishing are permitted and regulated according to state law. Waterfowl hunters are allowed to build hunting blinds according to special refuge regulations. Camping and motorized land vehicles are not permitted. Public use facilities are limited to the boat ramp and parking area at the south end.

8. Hunting

Waterfowl hunting accounts for the majority of the hunting use on the refuge. Turkey and Otter Islands were hunted heavily during the early duck season. Success was quite good with wood ducks and teal comprising the vast majority of the bag. Success rate was 1.5 birds per hunter. This was exceptionally good when compared with Iowa DNR's Lake Odessa controlled hunting area A. On Lake Odessa the success rate was 0.7 birds per hunter. Waterfowl hunting on Turkey and Otter Islands has been on the increase over the past five years. On Big Timber it was a different story. Birds were few and far between with some hunters going weeks without a shot. Most hunters had removed their hunting blinds by November.

9. Fishing

Sport fishing is the most popular activity on the refuge. A fisherman can be found eleven months a year trying his or her luck.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

Approximately five miles of river shoreline on Big Timber, Turkey and Otter Islands were reposted replacing signs lost during the '86 flood.

The public access was spot-gravelled with approximately 30 ton of road-stone.

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TR				Organization Number						Name				Report Period			
														Yr Mo			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
3	0	1	0	3	3	6	3	3	0	0	B	G	T				

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OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	NON-STD TOT. REHS
	18	19	20	21	22	23	24	25	26	27-35	36-45	46-55	
INTERPRETATION													
Wildlife Trails - Nonmotorized													
Self Guided	0	1	1	0	0	0	0	P	S				
Conducted	0	1	2	0	0	0	0	P	C				
Wildlife Tour Routes - Motorized													
Self Guided	0	2	1	0	0	0	0	P	U				
Conducted	0	2	2	0	0	0	0	P	T				
Interpretive Center	0	3	0	0	0	0	0	P	R				
Visitor Contact Station	0	4	0	0	0	0	0	P	Q				
Interpretive Exhibits - Demonstra													
Self Guided	0	5	1	0	0	0	0	P	A				
Conducted	0	5	2	0	0	0	0	P	M				
Other On-Refuge Programs	0	6	0	0	0	0	0	P	P				
ENVIRONMENTAL EDUCATION													
Students	1	0	0	0	0	0	0	P	E				
Teachers	1	1	0	0	0	0	0	P	B				
RECREATION-WILDLIFE CONSUMPTIVE													
Hunting Mig. Birds - Waterfowl													
Ducks	2	0	1	0	0	0	0	P	D	150	600		
Geese	2	0	2	0	0	0	0	P	G				
Swans	2	0	3	0	0	0	0	P	N				
General Waterfowl	2	0	4	0	0	0	0	P	W	590	2360		
Hunting Mig. Birds - Other	2	0	5	0	0	0	0	P	X				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	740	2960		

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TR Is		Organization Number				Name				Report Period		Yr Mo				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
3	0	1	0	3	3	6	3	3	0	0	B	G	T			

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OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	NON-STD TOT. REU
	18	19	20	21	22	23	24	25	26	27-35	36-45	46-55	
RECREATION-WILDLIFE CONSUMPTIVE (c't)													
Hunting Resident Game													
Upland Game Birds	2	1	1	0	0	0	0	P	L				
Big Game				Species (code)									
Deer - Gun	2	1	2	8	5	4	0	P	H	65	195		
Deer - Bow	2	1	3					P	J	85	340		
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
Small Game	2	1	5	0	0	0	0	P	Z	180	480		
Other Game	2	1	6	0	0	0	0	P	U				
Trapping	2	1	7	0	0	0	0	U	G				
Fishing													
Warmwater	2	2	1	0	0	0	0	U	W	7100	20825		
Coldwater	2	2	2	0	0	0	0	U	C				
Saltwater	2	2	3	0	0	0	0	U	S				
Clams, Crabs, Oysters, Frogs	2	2	4	0	0	0	0	U	Y				
Other Consumptive Wildl. Rec.	2	3	0	0	0	0	0	U	M				
RECREATION-WILDLIFE NON-CONSUMPTIVE													
Camping	3	0	0	0	0	0	0	U	H				
Picnicking	3	1	0	0	0	0	0	U	B				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	7430	21840		

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TR Code		Organization Number				Name				Report Period		Yr Mo	
2	3	4	5	6	7	8	9	10	11	12	13	14	15
3	0	1	0	3	3	6	3	3	0	0	B	G	T

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OUTPUT TYPE	LINE CODE										NO. VISITS	OUTPUT UNITS	NON-STD TOT. RCU
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE NON-CONSUMPTIVE												Act.Hr.	
Wildlife/Wildlands Observation													
Foot	3	2	1	0	0	0	0	U	E	90	180		
Land Vehicle	3	2	2	0	0	0	0	U	N				
Boat	3	2	3	0	0	0	0	U	L	85	220		
Other	3	2	4	0	0	0	0	U	P				
Photography	3	3	0	0	0	0	0	U	T				
Field Trials	3	4	0	0	0	0	0	U	X				
RECREATION - NON-WILDLIFE													
Camping	4	0	0	0	0	0	0	R	C				
Picnicking	4	1	0	0	0	0	0	R	P				
Swimming	4	2	0	0	0	0	0	R	S				
Boating	4	3	0	0	0	0	0	R	B	35	70		
Waterskiing	4	4	0	0	0	0	0	R	W				
Off Road Vehicling	4	5	0	0	0	0	0	R	V				
Other	4	6	0	0	0	0	0	R	M				
TOTAL VISITS TO REFUGE	0	9	0	0	0	0	0	P	V	8380			
FISH & WILDLIFE INFORMATION												Per.Sara	
Public Inquiries	5	0	1	0	0	0	0	F	P		141		
News Releases	5	0	2	0	0	0	0	F	N		4		
Personal Appearances	5	0	3	0	0	0	0	F	A				
Professional Services	5	0	4	0	0	0	0	F	S				
Exhibits	5	0	5	0	0	0	0	F	E				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	8590	615		

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C. LAND ACQUISITION

1. Fee Title

Work continued on acquiring the railroad grade forming the south boundary of the refuge. A few hang-ups were encountered with obtaining a clear title plus the owner was hospitalized for a lengthy period after being hit by a bus.

E. ADMINISTRATION



Here's what Keithsburg looks like--
centered in photo w/Mississippi on left.
5/14/86 RS

2. Youth Programs

The YCC enrollee and the assistant manager visited the refuge every week to pick up litter, mow and trim around the public accesses.

F. HABITAT MANAGEMENT

1. General

Due to low levels in the Mississippi throughout the year, refuge uplands and timber remained free from flooding for the first time in over six years. However, the low river levels made water management impossible from March - December. As a result, excellent waterfowl brood habitat

was available in the shallow sloughs and marshes but fall migration habitat was reduced considerably.

2. Wetlands

Conditions were relatively stable all year. A draw down was not attempted. Spring water levels were low, but by the end of April rainfall and runoff added 1.2 feet. May through August a foot of it was lost. September through December the level rose a bit (.3 ft.). Mid-May through October wetlands were choked with coontail and curly pondweed discouraging fishing activity. It is interesting to note that the water never did achieve the crystal clarity it did in 1986. It is likely due to the high incidence of rough fish found during test sampling.

3. Forests

The first timber sale on the District will likely occur on Keithsburg. The levee rehabilitation project (See I.2.) will require clearing trees within the levee boundaries. Since the rights to the timber resource were retained by the COE, their foresters were called upon to inventory and assess the resource to be cleared from the levee. The Corps valued the timber to be cleared at approximately \$3,000 and determined a formal sale would be required. The sale will be conducted early in 1988 and administered by COE.

G. WILDLIFE

2. Endangered and/or Threatened Species

Bald eagles and peregrine falcon are seasonal visitors. Neither are nesting on the refuge. Bald eagles winter in the area and peregrines stop by during migration.

	<u>Peak Population</u>	<u>Month</u>	<u>Total Use Days</u>
Bald eagle	29	January	1,350
American peregrine falcon	2	September	70

3. Waterfowl

Production

As with Louisa, Keithsburg waterfowl production estimates are based on breeding pair counts and backed up with brood observation data.

Five-Year Waterfowl Production Summary

	<u>Wood duck</u>	<u>Mallard</u>	<u>Hooded merganser</u>
1983	225	100	0
1984	500	40	0
1985	600	0	0
1986	640	25	25
1987	1,140	100	5

Activities aimed at increasing waterfowl production were early spring prescribed burns in upland nesting areas, muskrat trapping to maintain and improve marsh habitat conditions and maintaining water levels for brood habitat.

Why was production so high this year? Our guess is that the refuge was just about the only area around with brood habitat. Brood habitat conditions in the area were marginal due to environmental conditions discussed in the Louisa section. While conditions weren't as good as last year, conditions elsewhere were much worse.

Waterfowl Populations

As illustrated in the following table, the majority of waterfowl use occurs during the fall migration. Mallards comprise the bulk of the use followed by pintail, gadwall and wigeon. Ducks fed heavily on the abundant submergents throughout the fall. As with Louisa, off-refuge feeding flights failed to develop this year. By ice up in mid-December waterfowl had abandoned the refuge. Populations were hampered this year due to our inability to control water levels first from the 1986 levee break and then from low levels in the Mississippi which prevented desired fall flooding of additional habitat. Duck use totalled 1,726,149 use days, down 24% from the average, and goose use totalled 6,665 use days, down 29% from the average.

4. Marsh and Water Birds

Keithsburg attracts great blue heron and great egret from the New Boston rookery 2 miles north. Peak use occurred in September with 25 birds.

Many of the other common marsh and water birds seen at Louisa haven't been seen here the last three years. Occasionally a green-backed heron is seen.

5. Shorebirds, Gulls and Terns

Shorebird habitat is available only during draw down. And being that we maintained the pool this year there wasn't much to attract them.

1987 Waterfowl Populations

	<u>Geese</u>			<u>Duck Population</u>	
	<u>Canada</u>	<u>Snow</u>	<u>Use Days</u>	<u>Population</u>	<u>Use Days</u>
January	0	0	0	1,150	8,990
February	80	0	580	5,575	40,455
March	0	0	0	1,585	49,135
April	0	0	0	755	6,030
May	0	0	0	471	9,238
June	0	0	0	2,580	60,600
July	0	0	0	3,150	63,240
August	0	0	0	910	16,616
September	0	0	0	4,220	126,600
October	200	0	2,790	27,625	635,810
November	68	16	2,520	29,800	669,879
December	115	0	<u>775</u>	3,480	<u>39,556</u>
Total Use Days			Geese 6,665	Ducks	1,726,149

8. Game Mammals

White-tailed deer experienced a significant population increase during the year to an estimated 50 deer. Normally the population hovers around 20. We suspect the increase was due to the dry weather creating less than ideal conditions off-refuge.

The squirrel population remained stable.

11. Fisheries Resources

One Special Use Permit was issued for commercial fishing at the same time and in the same manner as the Louisa permit. Four sealed bids were received with the successful one at \$426.00.

Carp - 4,349 pounds Buffalo - 1,607 pounds

The rank coontail and pondweed growth curtailed fishing activity.

A significant fish kill occurred on the refuge June 20-22 involving several thousand bluegill, northern pike, crappie, bass, bullhead and some rough fish. Nearly 75 percent were bluegill. Abnormally warm water temperatures (90°+) and aquatic plant decomposition causing oxygen levels to decline were at fault. The die-off created considerable interest by the media.

Largemouth bass fingerlings, 16,500, were stocked on September 18. The stock was from Genoa NFH at LaCrosse, Wisconsin, to replenish those lost in the floods and levee break during 1986 and the fish kill this year. Extensive sampling was done by Fisheries Biologist Milligan and Illinois DOC biologists to gather data for preparation of a fisheries management plan for the refuge.

15. Animal Control

One Special Use Permit for furbearer trapping was issued with a successful bid of \$310. Following are the harvest totals:

<u>Muskrat</u>	<u>Raccoon</u>	<u>Beaver</u>	<u>Skunk</u>
66	39	16	0

The harvest was far below the permittee's and our expectations.

H. PUBLIC USE

1. General

Public use at Keithsburg is almost entirely sport fishing. Facilities are limited to the main parking lot with a boat ramp on the south end and the small parking area at Spring Slough on the north. There are no hiking trails or interpretive kiosks.

8. Hunting

Hunting is limited to squirrels. Gray and fox squirrel are the only huntable species and the season ran from September 1 through September 4 this year. The season is from the opening of the state squirrel season until the opening of the early teal season when the refuge closes to public use. Hunting pressure is extremely light. We've yet to encounter a squirrel hunter in more than five years.

9. Fishing

As mentioned earlier, almost all public use is sport fishing. The most active times are during the winter (on the ice) and early spring while it is still navigable by boat (before aquatic plants take over).

There has been considerable public concern about the sport fishing resource this last year. First was the October, 1986, levee break. The concern was that we would drain the refuge to make repairs. Temporary repairs were made without any draw down. Then came the June fish kill which stirred the pot again. The September stocking of 16,500 large mouth bass, if nothing else, helped soothe concerns.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

ARMM

The concrete and rock-filled emergency spillway on the north end of the levee had been overtopped by flood waters several times since construction. A lot of rock within the spillway had washed away leaving the spillway impassable to vehicles and equipment with no access to the remainder of the levee. The rock was replaced within the spillway using 2-inch clean rock. Then the entire spillway top was grouted with concrete to hold the rock in place. Total cost of the force account project was \$1,800.

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TR		Organization				Name				Report Period					
Code		Number								Yr Mo					
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
3	0	1	0	3	3	6	3	2	0	0	K	T	S		

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OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	NON-STD TOT. REUS
	18	19	20	21	22	23	24	25	26	27-35	36-45	46-55	
RECREATION-WILDLIFE CONSUMPTIVE(c't													
Hunting Resident Game													
Upland Game Birds	2	1	1	0	0	0	0	P	L				
Big Game				Species Code)									
Deer - Gun	2	1	2					P	H				
Deer - Bow	2	1	3					P	J				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
Small Game	2	1	5	0	0	0	0	P	Z	10	30		
Other Game	2	1	6	0	0	0	0	P	U				
Trapping	2	1	7	0	0	0	0	U	G	100	440		
Fishing													
Warmwater	2	2	1	0	0	0	0	U	W	3375	7295		
Coldwater	2	2	2	0	0	0	0	U	C				
Saltwater	2	2	3	0	0	0	0	U	S				
Clams,Crabs,Oysters,Frogs	2	2	4	0	0	0	0	U	Y				
Other Consumptive Wildl. Rec.	2	3	0	0	0	0	0	U	M				
RECREATION-WILDLIFE NON-CONSUMPTIVE													
Camping	3	0	0	0	0	0	0	U	H				
Picnicking	3	1	0	0	0	0	0	U	B				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	3485	7765		

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TR Code			Organization Number							Name				Report Period		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
3	0	1	0	3	3	6	3	2	0	0	K	T	S			

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OUTPUT TYPE	LINE CODE										NO. VISITS	OUTPUT UNITS	NON-STD TOT. REP
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE NON-CONSUMPTIVE												Act. Hr.	
Wildlife/Wildlands Observation													
Foot	3	2	1	0	0	0	0	U	E	95	200		
Land Vehicle	3	2	2	0	0	0	0	U	N				
Boat	3	2	3	0	0	0	0	U	L				
Other	3	2	4	0	0	0	0	U	P				
Photography	3	3	0	0	0	0	0	U	T				
Field Trials	3	4	0	0	0	0	0	U	X				
RECREATION - NON-WILDLIFE													
Camping	4	0	0	0	0	0	0	R	C				
Picnicking	4	1	0	0	0	0	0	R	P				
Swimming	4	2	0	0	0	0	0	R	S				
Boating	4	3	0	0	0	0	0	R	B				
Waterskiing	4	4	0	0	0	0	0	R	W				
Off Road Vehicling	4	5	0	0	0	0	0	R	V				
Other	4	6	0	0	0	0	0	R	M				
TOTAL VISITS TO REFUGE	0	9	0	0	0	0	0	P	V	3580			
FISH & WILDLIFE INFORMATION												Per. Sara	
Public Inquiries	5	0	1	0	0	0	0	F	P		121		
News Releases	5	0	2	0	0	0	0	F	N		7		
Personal Appearances	5	0	3	0	0	0	0	F	A				
Professional Services	5	0	4	0	0	0	0	F	S				
Exhibits	5	0	5	0	0	0	0	F	E				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z	3675	328		

Region 3 Station Keithsburg Date Prepared 1987

Name

New steel bar grating walkways and handrails were constructed on the water control structure. The project was completed force account at a cost of \$1,000.



Before



After

The 1986 levee break was temporarily repaired under contract. The project required only a day and a half of dozer time. The contractor was able to obtain enough material from the washout area to build the temporary patch up to original grade. The top was gravelled and the side slopes seeded to a cool season grass mixture. Total cost of the project was \$2,000.

The refuge received approximately \$1.2M in flood damage monies to rehab. the entire Keithsburg levee. The project entails reshaping the entire 3+ mile levee and rip-rapping selected stretches exposed to the Mississippi River. Survey work was completed in November. Permits remain to be acquired following a required archaeological survey of the borrow areas. Borrow areas will be from abandoned crop fields with the sites to be "dished out" to provide additional breeding pair habitat. A berm will be constructed on the pool side of the levee as protection from burrowing critters, especially muskrat and beaver. RO Engineering is handling the contract and expects bid invitations for the project to be out in March, 1988, with construction activities to commence during the summer of 1988. This will likely be a 2-3 year project depending on the status of the Mississippi River.



Repair of 1986 levee break...road rock and seeding completed later.
6/23/87

WS

CLARENCE CANNON NATIONAL WILDLIFE REFUGE

Annada District

MARK TWAIN NATIONAL WILDLIFE REFUGE

Annada, Missouri

ANNUAL NARRATIVE REPORT

Calendar Year 1987

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

CLARENCE CANNON NATIONAL WILDLIFE REFUGE

Annada, Missouri

ANNUAL NARRATIVE REPORT

Calendar Year 1987

Ross Adams
Refuge Manager

January 27, 1988
Date

Monty H. Shubert
Project Leader

Feb. 2, 1988
Date

Matthias H. Kroschbaum
Refuge Supervisor Review

4-4-88
Date

John R. Eadie
Regional Office Approval

4/4/88
Date

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2

4

Personnel

3

1

1. N. Ross Adams, Refuge Manager, GS-11, PFT, EOD 1/23/84
2. Susan L. Bolander, Assistant Refuge Manager, GS-7, PFT, EOD 7/5/87
3. Carolyn A. Watts, Secretary, PPT, GS-4, EOD 4/19/81
4. John D. Allan, Maintenance Mechanic, WG-9, EOD 2/20/67

INTRODUCTION

Clarence Cannon National Wildlife Refuge, located in Pike County, Missouri, one mile east of Annada, is situated within the Mississippi River floodplain adjacent to Pool No. 25. The refuge has 12 manageable moist soil units totaling 1,362 surface acres, 237 acres of green tree reservoirs, 4 semi-permanent waterbodies totaling 72 acres, 750 acres of recently tilled cropland and 1,326 acres of other lands including forests, brush, grass and water. Total acreage is 3,747. A levee around the perimeter of the refuge provides protection from the Mississippi River floodwaters in most years.

The refuge was purchased fee title in 1964 with funds from the sale of migratory waterfowl stamps. The refuge, named after Congressman Clarence Cannon, was established with the primary objective of providing a feeding and resting area for waterfowl during migration. Recent emphasis has elevated the importance of management of moist soils to provide for the needs of waterfowl and other wildlife while de-emphasizing the cropland management program.

A. HIGHLIGHTS

The east levee was rebuilt to 449.5 feet elevation by a minority contractor. (Section I.2.)

Flood damage money was appropriated which will allow raising the east and south levees to 451.5, which will provide protection from all but the 100-year floods. (Section E.5. and I.2.)

Assistant Manager McKinney received a special achievement award and \$400 for his efforts in securing volunteers to construct and landscape an observation deck in line with the Take Pride in America theme. (Section E.1.)

Brad McKinney transferred to Region 6 as assistant refuge manager of Crescent Lake National Wildlife Refuge. (Section E.1.)

Susan Bolander transferred from Crab Orchard National Wildlife Refuge to serve as assistant manager of Clarence Cannon Refuge. (Section E.1.)

Volunteers constructed and landscaped an observation deck near refuge headquarters to provide information to visitors who stop after office hours. (Section E.4., H.6. and I.2.)

Several water management construction projects were completed force account. (Section F.2. and I.2.)

The refuge hosted an administrative inspection by personnel from the Region 3 office, the Division 2 biologist, DeSoto Refuge, and the Mark Twain Refuge. (Section E.6. and E.8.)

B. CLIMATIC CONDITIONS

Precipitation was below average for all but three months of the year. High evaporation rates combined with this lack of rainfall made water management difficult and expensive.

Several moist soil units had to be flooded by use of the pump adjacent to Bryants Creek. Pumping began in September, and by the time it ended, the pump had consumed 2,000 gallons of diesel fuel and \$2,600 in repair bills. The total flooded area was 600 acres.

Waterfowl use was below average for most of the fall, probably due to these dry conditions.

It was not until November that rainfall was sufficient enough to collect in the moist soil units, but even with above average rainfall for the last two months of the year, little change was seen in water levels.

Table B-1 summarizes 1987 weather data.

TABLE B. 1
1987 WEATHER DATA¹

Month	Precip.	50 Yr. Avg. ²	Temp. Extremes		Evaporation
			Max.	Min.	
Jan.	1.35"	1.78"	50°F	-16°F	No Data
Feb.	Trace	1.80"	66°F	18°F	No Data
Mar.	3.00"	3.04"	77°F	20°F	No Data
Apr.	3.03"	3.62"	88°F	20°F	No Data
May	1.84"	3.81"	91°F	45°F	4.18"
June	1.36"	4.01"	100°F	50°F	8.03"
July	4.63"	3.61"	101°F	56°F	7.80"
Aug.	2.83"	3.46"	104°F	44°F	7.26"
Sep.	1.67"	3.37"	90°F	39°F	4.79"
Oct.	0.99"	2.95"	82°F	22°F	No Data
Nov.	5.10"	2.42"	82°F	15°F	No Data
Dec.	5.71"	2.12"	58°F	1°F	No Data
Total	31.51"	35.99"	Avg. 82°F	Avg. 26°F	32.06"



YCC enrollees cleaning out plugged culvert. NRA, 7/87



Volunteers from local trade school constructing an observation deck at refuge headquarters. BWM, 4/87

- 1 Data taken at Clarence Cannon NWR, Annada, MO.
- 2 Data prior to 1965 obtained from U.S. Plant Materials Center (SCS), Elsberry, MO.

C. LAND ACQUISITION

1. Fee Title

Realty made offers to the owners of the small parcels on the southeast and southwest corners of the refuge which contain sections of the main levee. The Elsberry Drainage District accepted the offer for approximately ten acres on the southwest corner. Realty and the owner of the southeast corner are still negotiating on the five acres on the southeast corner. Hopefully, both parcels will be in Service ownership before construction activities reach these portions of the levee.

D. PLANNING

2. Management Plan

The Search and Rescue Plan for the station was written and approved.

A Bottomland Reforestation Plan was approved for Division 2 refuges. The plan identified 1,300 acres of cropland on the Annada District of the Mark Twain Refuge for conversion to bottomland hardwood forests.

4. Compliance with Environmental and Cultural Resource Mandates

A representative from the Corps of Engineers from the St. Louis District inspected the site of the proposed levee rehabilitation project and determined a permit was not needed. An environmental assessment of the proposal was submitted to the Region and approved with a finding of no significant impact.

A proposal to re-establish bottomland hardwoods on croplands was determined to be a categorical exclusion.

E. ADMINISTRATION

1. Personnel

On July 5, 1987, Brad McKinney transferred to Region 6 to serve as assistant manager of Crescent Lake National Wildlife Refuge.

Susan Bolander transferred from Crab Orchard National Wildlife Refuge to Clarence Cannon Refuge to serve as assistant manager effective July 5, 1987.

Tractor Operator Keith Kirby was terminated effective May 8, 1987.

Brad McKinney received a special achievement award and \$400 for his efforts in securing volunteers to construct and landscape an observation deck in line with the Take Pride in America theme. The carpentry class at the vocational school in Eolia provided the tools and carpenters to construct the deck whereas the Morgan County, Illinois, Audubon Society provided people to plant shrubs and trees. Total savings to the government was estimated at \$7,000.

Secretary Watts and Maintenance Mechanic Allan both received a Level IV performance rating for their excellent efforts above and beyond performance plan requirements.

The full-time equivalent allocation for the Clarence Cannon Refuge remained at 4.6 staff years.

2. Youth Programs

The refuge hosted what was intended to be an eight-week, non-residential Youth Conservation Corps (YCC) camp. One of the two enrollees resigned after five weeks, so the remaining enrollee worked a total of eleven weeks.

The crew completed numerous projects such as: wood duck box inspection; secretarial duties, landscaping, painting, and facility maintenance.

The YCC program was completed without injuries.

4. Volunteer Programs

Students of the Pike/Lincoln Technical Center's building trades class constructed an observation deck adjacent to the refuge headquarters. The students donated 260 hours of their time, saving the Service approximately \$7,000.

Members of the Morgan County Audubon Society donated 32 hours of time to landscape the area around the new deck and office building.

A volunteer spent 20 hours installing radios in refuge vehicles, saving the Service several hundred dollars.

5. Funding

Refuge funding over the past five fiscal years is summarized as follows:

<u>FY</u>	<u>O & M</u>	<u>ARMMS</u>	<u>1520</u>	<u>8260</u>
1987	\$138,000	\$37,000 Small Projects	\$2,500	--
1986	\$132,100	\$7,000 Small Projects	\$7,500	\$1,649
		\$363,000 Large Projects		
1985	\$153,000	\$33,000 Small Projects	\$7,500	\$2,561
1984	\$167,656	\$56,000 Large Project	\$5,000	\$9,950
1983	\$167,423	---	\$1,800	\$3,100

A flood damage supplemental appropriation in the amount of \$1,121,900 was awarded for use on Clarence Cannon Refuge. The money will be used to repair existing damage on the south levee and to raise the south and east levee by two feet.

A small ARMM project for reseeding the north levee was rejected in July because the bids were too high. Nine thousand dollars of this money was transferred to the Calhoun Division for a concrete floor in their equipment building.

6. Safety

No lost-time accidents occurred during 1987.

Tractor Operator Kirby remained on the Office of Personnel Management's Worker's Compensation Program due to a back injury sustained in 1985. This employee was terminated in May.

Assistant Project Leader Anduss conducted a general safety inspection in May. Several suggestions were made and action was taken on each.

An annual safety and environmental health inspection was conducted by Assistant Manager Bolander in August.

Refuge personnel received CPR training and certification in December.

Deficiencies noted in the administrative inspection were corrected where possible. A proposal to remove the sluice box from Bryants Creek appears impractical under current budgetary constraints. Signs are located on both sides of the creek warning boaters of this obstruction.

8. Other

The refuge hosted an administrative inspection by personnel from the Region 3 office, the Division 2 biologist, the Mark

Twain Complex Office, and DeSoto Refuge. Most comments from the inspection team were favorable. A few minor safety problems were identified and corrected (see E.6.).

F. HABITAT MANAGEMENT

2. Wetlands

The refuge currently has twelve manageable moist soil units (MSU's) totaling 1,375 acres, three green tree reservoirs (GTR's) totaling 237 acres, and four semi-permanent water bodies totaling 72 acres. Elevation throughout the refuge varies less than four feet.

Water is supplied to managed units via a ditch system, Crissafulli pump, and a stationary 20,000 gallon per minute pump that pulls water from Bryants Creek. Timely precipitation and/or high river levels can greatly affect operations by lowering pumping requirements, but are not dependable.

Water was drawn from four MSU's in January with the hope that the 2" of ice on the units would fall, bringing the vegetation with it. This would greatly improve the substrate for invertebrates plus make room for the spring rains. The spring rains never developed as anticipated, leaving the MSU's with lower water levels than desired. This was not a successful practice and will not be attempted in the future.

All units evaporated in June or July and precipitation was unusually low all summer. Moist soil units were extremely dry and the vegetation suffered. In June, water was pumped into MSU's 2 and 3 for 125 hours to improve conditions for waterfowl broods and wading birds. The evaporation rate was so high that water levels dropped quickly. Water was again pumped in July after a heavy rain, but after 30 hours it was evident that evaporation was still too high to effectively maintain water levels by pumping.

In September, pumping for the fall migrants began. After 69 hours, the pump broke down and was not repaired until early October. Pumping then resumed and after 469 hours, over 500,000,000 gallons of water covered 600 acres in seven moist soil units. Waterfowl use increased dramatically, especially in the mowed portion of MSU 5. Other water management units on the refuge remained dry and received little or no waterfowl use.

A dike and water control structure placed at the north end of Rabbit Ears separated the marsh from the main ditch and greatly improved water management capabilities on the marsh (See I.1.).

A low level dike was constructed on the east side of MSU 7 and a water control structure was placed in the north ditch. This

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A low level dike was constructed on the east side of MSU 7 and a water control structure was placed in the north ditch. This

development will allow higher water levels to be maintained in MSU 7 (see I.1.).

Portions of MSU's 4, 5, 6, and 7 were mowed to set back the invasion of cottonwood, willow, and cocklebur and to provide openings for waterfowl feeding and loafing.

4. Croplands

The cooperative farmer planted a total of 747 acres on Cannon including 222 acres of soybeans, 382 acres of corn and 143 acres of wheat. The cooperative farmer filed a complaint with his congressman that the refuge was not allowing him to farm enough land. In anticipation of additional acreage that didn't materialize, he disked part of a field not in the agreement.

Because of the unusually dry spring, fields were in good shape to work in late April or early May. The cooperator was in Japan on personal business until early June and, therefore, could not take advantage of the best planting conditions. He planted corn on June 6 and got poor germination because of low soil moisture. One and a half inches of rain fell the last three days of June which stimulated germination of about 1/3 of the corn seeds which were still dormant.

The cooperative farmer disked approximately 20 acres of wetlands that were not included in the cooperative agreement. The refuge manager notified him on June 24 that his cooperative agreement would not be renewed in 1988 because of this and past abuses and violations of the special conditions in the agreement.

Two fields of corn yielded 40 bushels to the acre and the rest averaged about 80 bushels per acre. The wheat stand was excellent.

9. Fire Management

Fifteen acres of levees and dikes were prescribed burned to control broadleaf forbs and invading woody species.

Two warm-season grass stands (42 acres) were burned to promote the growth of preferred species and to set back the invasion of woody plants.

10. Pest Control

The cooperative farmer treated 382 acres of corn ground with two pounds of atrazine (active ingredient) per acre. The farmer treated 222 acres of soybean ground with 1 pound of Treflan and one pound of Sencor per acre.

G. WILDLIFE2. Endangered and/or Threatened Species

Bald eagles frequent the refuge between October and March. Eagle numbers remained between five and ten during the fall; total use days for the year was 396.

The northern harrier and the king rail are both listed as endangered in the state of Missouri and are fairly common visitors to the refuge. The king rail nests on the refuge.

3. Waterfowl

Fall waterfowl populations were below average, probably due to dry conditions on the refuge. Only 600 acres of moist soil units were flooded for the fall migration, compared to 1,600 flooded acres in a normal year. Waterfowl use increased toward the end of the year as it finally began to rain.

Waterfowl production was 174 wood ducks and 17 mallards.

Table G.3-1 summarizes waterfowl use on the refuge.

TABLE G. 3-1

MONTHLY WATERFOWL USE DAYS - CY 1987

<u>Month</u>	<u>Ducks</u>	<u>Geese</u>	<u>Total</u>
January	145,740	74,805	220,545
February	146,954	1,360	148,314
March	387,966	--	387,966
April	165,292	--	165,292
May	4,525	--	4,525
June	1,455	--	1,455
July	450	--	450
August	738	--	738
September	1,194	--	1,194
October	11,290	4,418	15,708
November	223,434	110,870	334,304
December	198,173	283,247	481,420
TOTAL	1,287,211	474,700	1,761,911
OBJECTIVE	3,000,000	400,000	

4. Marsh and Water Birds

Marsh and water bird use-days dropped slightly from 1986. This is probably due to extremely dry conditions in the summer, which reduced the available habitat for these species.

5. Shorebirds, Gulls, Terns, and Allied Species

Use-days for this group decreased in 1987, again due to dry conditions.

6. Raptors

Raptor use of the refuge increased this year, but not significantly. No unusual sightings were made.

17. Disease Prevention and Control

Refuge staff conducted weekly inspections of the refuge and found no disease problems.

H. PUBLIC USE

1. General

Refuge staff erected four gates on refuge roads to help control traffic during periods of high eagle and waterfowl use and when roads are in poor condition due to flooding, snow, etc.

The refuge hosted an Open House in November which included slides, videos, and a self-guided auto tour. About 100 people attended the Open House; most of these were local farmers and friends of the refuge. A good time was had by all as they TOOK PRIDE IN AMERICA.

Public use averaged 60 visitors per month.

5. Interpretive Tour Routes

A self-guided interpretive auto tour was developed for the open house (see Section H.1.).

6. Interpretive Exhibits/Demonstrations

The Morgan County, IL chapter of the Audubon Society donated 75 slides to the refuge. These slides were mainly of birds that can be found in the area and are of an excellent quality. The slides are being used in interpretive programs given both on and off of the refuge.

A copy of In Celebration of America's Wildlife was added to the refuge's video library.

The System 70 was displayed on the observation deck during the Open House and during Eagle Days at the Apple Shed in Clarksville.

An observation deck was constructed near the refuge visitor center. The deck will offer after hours and weekend visitors an opportunity to familiarize themselves with refuge objectives, management practices and permitted activities. This interpretive facility is a valuable addition to refuge facilities and should help to improve the image of the refuge and Fish and Wildlife Service in the eyes of the visitors. The Take Pride in America project received good reviews in the local media and the following article was printed in the June-July issue of Fish and Wildlife Service News.

7. Other Interpretive Programs

The refuge staff, the outdoor recreation planner in Quincy and the visual information specialist in Technical Services developed a leaflet for the Clarence Cannon National Wildlife Refuge. A copy of this leaflet is attached.

17. Law Enforcement

Special Agent Leapley cited two St. Louis residents for hunting deer on the refuge during the first day of the Missouri deer season.

I. EQUIPMENT AND FACILITIES

1. New Construction

A 400-foot dike was constructed from spoil from the main ditch at the north end of Rabbit Ears Marsh. The dike along with a corrugated metal pipe and 18-inch screwgate will allow the marsh to be managed separately from the main ditch (Section F.2.).

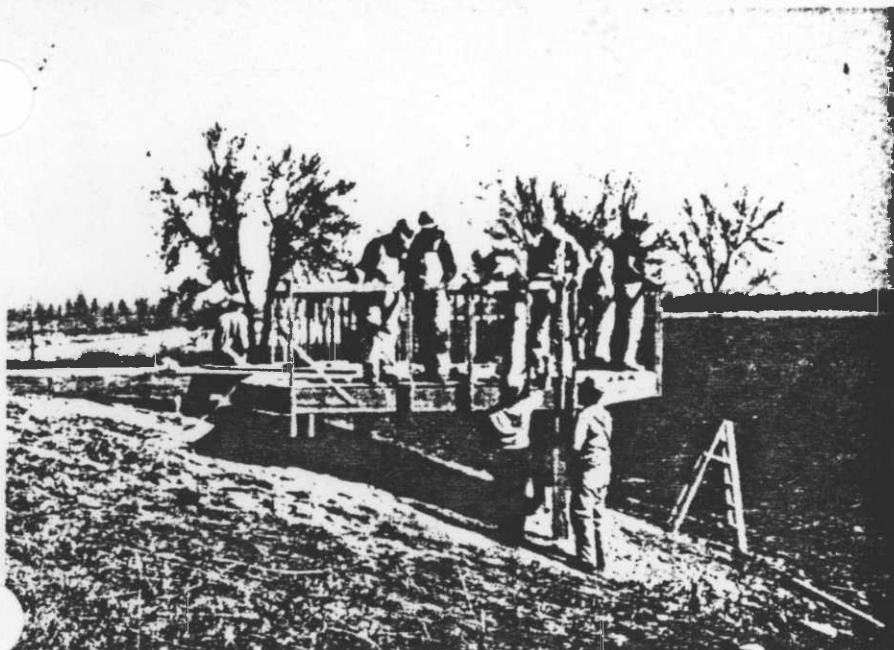
Approximately 6,500 feet of low level dike was built with the grader on the east side of MSU 7. This dike will enable managers to hold another foot of water in the unit thus providing additional flexibility in managing moist soils of this unit (Section F.2.).

An observation deck was constructed near the refuge office by volunteers. This new facility was constructed from a standard design provided by the Region 3 Engineering office and was laid out by the landscape architect from that office (Sections E.4. and H.6.).

2. Rehabilitation

Maintenance Mechanic Allan partially filled the three breaks in the east levee pushing fill material from the base of the levee into the breaks with the D-8. He also removed an old pipe

Volunteers Build Observation Deck



Volunteers construct an observation deck on the Clarence Cannon National Wildlife Refuge. Complete with interpretive panels, the deck enables the refuge to provide information to after-hours and weekend visitors.

Brad McKinney
Clarence Cannon National Wildlife
Refuge
Annada, Missouri

In conjunction with the *Take Pride in America* initiative and the Service's volunteer program, residents of the Clarence Cannon National Wildlife Refuge community recently volunteered their services to

build an observation deck on the refuge.

The local Union Electric Company broke ground for the deck on March 20 by providing the equipment and manpower necessary to prepare the site for concrete footings. Soon afterwards, volunteers from nearby Pike/Lincoln Technical Center who were enrolled in a building trades class began work on the deck construction as a class project. Their instructor, John Hopkins, used the



Jim Ross, Public Affairs Officer

project to teach students the principles and procedures of construction. The deck, located near the refuge headquarters, was finished in early May.

According to Refuge Manager Ross Adams, once interpretive panels had been mounted on the deck railing, the refuge was better able to serve after-hours and weekend visitors interested in learning more about the Clarence Cannon Refuge, its management of wildlife resources, and recreational opportunities.

Contracted out, the cost of the deck and interpretive panels would have been approximately \$14,000 but, because of the volunteer participation, the cost of construction and landscaping was less than \$8,000. "While the dollar savings is important," Adams noted, "the biggest dividend has been the resulting public awareness generated for the refuge and the *Take Pride in America* campaign."

Exhibit Available

Region 3 Director Harvey Nelson (left) and Acting Assistant Regional Director for Refuges and Wildlife John Eadie pose before the region's new *Take Pride in America* exhibit which was designed and produced by regional Refuges & Wildlife staff. It is available for purchase by other regional offices. For more information, contact Tom Kelley at FTS 725-3924.





Maintenance Mechanic Allan working spoil from main ditch into a dike to hold water in Rabbit Ears Marsh.
NRA, 6/87



Pre-construction meeting with representatives from the refuge (Manager Adams in typical work mode), Division of Engineering, minority contractor, and subcontractor. BWM, 3/87



Refuge crew installing concrete box at Hemphill crossing. NRA, 4/87

through the levee used to flood rice fields by farmers long before the refuge was established.

The Annada Flood Protection Association raised a portion of the west levee at the north end to provide an additional foot of flood protection.

A large ARMM minority contract to repair flood damage to the east levee from the 1983 flood rebuilt the slopes to a 3:1 grade and rebuilt the top to an elevation of 449.5, the existing elevation before the flood damage.

Flood damage supplemental money appropriated in 1987 will be used to raise the east and south levee to 451.5 feet in 1988. This rehabilitation project will provide protection from all but the 1973-type floods.

Maintenance Mechanic Allan replaced the corrugated metal pipe and water control structure on Goose Pasture moist soil unit.

Maintenance Mechanic Allan cleaned out a half mile of the main ditch between Crane Pond and Goose Pasture Green Tree Reservoir and 400 feet east of Hemphill crossing.

The refuge staff replaced a plugged 36-inch pipe at Hemphill crossing with a 4X4 foot concrete box.



Contractor reshaping the slope on the east levee.
NRA, 4/87

3. Major Maintenance

Maintenance Mechanic Allan repaired the 48 - inch flapgate at the water control structure at the pumphouse. The cast iron ring was broken in two places.

The east pump developed a cracked head and clutch problems. The repair bill totalled \$2,600.

4. Equipment Utilization and Replacement

All refuge equipment was used in 1987. The starting motor on the D-4 is broken and this ancient piece of equipment may be excessed instead of repaired.

No equipment was replaced during the year.

5. Communications Systems

The refuge acquired two Midland 80-channel radios for mobile units and two King 14-channel portable radios for law enforcement purposes. The refuge now has the capability to contact other enforcement agencies in case of emergencies or when assistance is needed outside of regular refuge office hours.

6. Computer Systems

The refuge acquired parts of an IBM PS/2 Model 60 computer with a NEC dot matrix printer and an IBM letter quality printer. Five software packages were also received: Word Perfect; Cross Talk, Microsoft Multiplan, Microsoft Chart, and R:Base System V. This computer is expected to reduce the time spent on monotonous administrative duties. Once the entire system arrives and the staff learns to use it, it should prove to be extremely valuable.

7. Energy Conservation

Consumption of LP gas used to heat the office building decreased 20% from last year due to mild weather.

Energy use in all other areas increased, due to more miles driven, more equipment in operation, and more pumping requirements because of dry weather.

J. OTHER ITEMS

4. Credits

Assistant Manager Bolander wrote sections B, E.2., 4., 6.; F.2. and 9.; G.; H.; and I.6. and 7.

Manager Adams wrote sections C.; D.; E.5.; F.4. and 10.; I.1., 2., 3., 4., and 5.; J.; and K.

Secretary Watts typed, proofread, and assembled the report.

K. FEEDBACK

This was an exceptionally productive year at Cannon and I would like to relate my impression of the work of the Service and effects on Clarence Cannon Refuge in 1987.

First and foremost, the assistant managers, the maintenance mechanic and the secretary at Cannon are all highly skilled, highly motivated, top notch people and have done an excellent job in working towards accomplishing the goals and objectives of the refuge. Credit for most of the accomplishments must go to them.

Secondly, we received good support from the Mark Twain Refuge Complex in Quincy. Quincy staff spent considerable time working on development of refuge leaflets and interpretive panels for the deck, administering of the hunting and trapping programs, and coordinating aerial seeding of wheat on the Gardner Division.

The Louisa and Calhoun Districts of the Mark Twain National Wildlife Refuge both contributed to the law enforcement efforts on the Gardner Division. The Calhoun District loaned their Case dozer for work on Delair. The Quincy support also included a couple of sessions of serious "counseling" to keep the manager on the right track. This was done in a positive, constructive, and professional manner and I am sure the sessions improved overall management of the refuge.

Thirdly, comments, encouragement and support from RF-2 were greatly appreciated. I am pleased to have had the privilege to work under John and Jay.

Fourthly, we tapped the services of many support divisions in the Regional Office during the year and cooperation was excellent. Engineering provided substantial support to the refuge on the levee rehabilitation, the deck project, and the ditching project at Delair. We especially enjoyed Bill Greenwald's visits and his tips on the stock market! Personnel provided guidance in terminating a problem employee, assisted in recruiting temporary employees, helped to quickly fill the assistant manager position after McKinney transferred, and perhaps most importantly, kept the payroll checks coming on time. Technical Services provided art work and laid out the refuge brochure and interpretive panels for the deck plus guided us through successful volunteer and Take Pride in America efforts. Facilities Management assisted in tracking projects and insuring the paper requirements were met on various projects plus submitted a flood damage assessment which resulted in a 1.1 million supplemental appropriation. Realty worked on the acquisition of two small parcels of land critical to maintaining the refuge levee. Safety was helpful in processing workers compensation claims for the tractor operator and in managing a safe work environment for our staff. Information Resource Management arranged for a new computer system for the refuge. Contracting and General Services

assisted in the disposal of an excess building and grain bin, and awarded contracts for the levee rehabilitation and ditch projects plus processed the acquisition for new radio equipment and a seeding project.

The Special Agent in Jefferson City provided valuable information for upgrading the communication capabilities on the refuge. The Special Agent in St. Charles provided law enforcement coverage on and in the vicinity of the refuge at times.

A lot of good work was accomplished for the benefit of the resources and refuge visitors in 1987. The information above is only a partial list of support received during the year. My thanks go to all who contributed to this effort.

DELAIR DIVISION
MARK TWAIN NATIONAL WILDLIFE REFUGE
Pike Station, Illinois

ANNUAL NARRATIVE REPORT
Calendar Year 1987

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

INTRODUCTION

The Delair Division of the Mark Twain National Wildlife Refuge, located in Pike County, Illinois, three miles south of the Louisiana, Missouri bridge, is situated in the Mississippi floodplain adjacent to Pool No. 24. The refuge, protected from the river by a levee, is 1,737 acres of marsh, water, forest, and cropland. The semi-permanent water areas include: Upper Swan Lake-36 acres, Lower Swan Lake-55 acres, Upper Butcher Pond-8 acres, Lower Butcher Pond-31 acres, Hanei Pool-11 acres, and Flake Hole-15 acres.

All lands on Delair are one to ten feet below normal pool stage of the river and, therefore, water is provided to the area via seeps and gravity flow throughout the year.

The area was purchased fee title in 1965 and 1976 with funds from the sale of migratory waterfowl stamps. The primary purpose for acquiring the area was to provide a feeding and resting area for waterfowl during migration.

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A. HIGHLIGHTS

Bald eagles constructed a nest at the southeast corner of Cattail Marsh (Section G.2.).

A ditching project was completed on Delair which greatly improved water management capabilities on the area (Section I.1.).

Swan Lakes were dewatered and supported an impressive production of moist soil plants (Section F.2.).

B. CLIMATIC CONDITIONS

Weather conditions were similar to Clarence Cannon's. Seep water from the Mississippi River prevented moist soil units from becoming excessively dry during the summer. It also allowed flooding of moist soil units in the fall in spite of below average rainfall and low river levels.

F. HABITAT MANAGEMENT

2. Wetlands

General Information

The ditch rehabilitation project and associated work made it possible to dewater Upper and Lower Swan Lakes, Cattail Marsh, Hanei Pool, Upper Butcher Pond, South Marsh and Lower Butcher. With the exception of Cattail Marsh and South Marsh, all of these units can be flooded to desirable depths for waterfowl and wading bird use at any time of the year with seep water from the Cattail Marsh area. To achieve full coverage of Cattail Marsh and South Marsh, elevated river levels or substantial precipitation or a combination thereof is needed. With a siphon these two units could be filled any time of the year; however, the present management capability is adequate for accomplishment of refuge objectives in most years.

All lands on Delair are one to ten feet below normal pool stage of the Mississippi River. Therefore, a siphon would provide water to cover the entire unit. However, this isn't feasible with private property in the water shed.

Should the Service ever have the opportunity to acquire the Garner property on the northwest corner of the refuge, construction of a siphon and a few hundred feet of low level dike would allow the Delair Division to be managed as a 1,600 acre shallow lake. This would be cheaper and easier to manage and wildlife benefits for water-oriented wildlife would greatly exceed the benefits available under current management.

Waterfowl maintenance objectives set forth in the Refuge Management Plan include 2,000,000 duck use days and 500,000 goose use days.

1987 Water Management

Upper Butcher Pond and Hanei Pool evaporated through the summer and were dry by August. Cattail Marsh was drained by April 1, when the dredging was completed in the Swan Lakes. Both Swan Lakes were drained in April, but held a few inches of water through the summer in seep areas. Lower Butcher Pond was drawn down in May to allow the Sny Drainage District to pass through the refuge on the Sny levee.

Vegetation response was excellent in all units.



Ditch clean out enabled drawdown of Swan Lakes resulting in excellent production of plants such as Walter's millet. SLB, 8/87

Flooding of Swan Lakes began in September and was completed by October. Hanei Pool and Upper Butcher Pond were flooded by late October and Lower Butcher Pond did not pick up water until November. Waterfowl responded well in all areas. Cattail Marsh and South Marsh were almost dry through the end of November. December rains and elevated river levels brought water in Cattail Marsh and South Marsh to satisfactory levels.

4. Croplands

The cooperative farmer planted 516 acres including 232 acres of corn, 151 acres of soybeans and 133 acres of wheat. The corn yielded approximately 100 bushels per acre and the wheat stands were excellent. Approximately 60 acres of second year wheat and clover developed into idled weed fields. Twenty acres of second year wheat and clover in the north end of field 9 grew well.

9. Fire Management

A 40-acre diked area on the south end of the division was burned in order to expose its contour. The area was later developed into South Marsh.

10. Pest Control

The cooperative farmer treated 222 acres of corn ground with two pounds of atrazine (active ingredient) per acre.

The farmer treated 151 acres of soybean ground with six ounces of Surflan and $\frac{1}{2}$ ounce of Classic per acre.

Approximately 200 purple loosestrife plants were hand pulled from the Garner Slough by refuge staff and YCC enrollees. Most of the plants were young; however six healthy mature plants which escaped control efforts of the past two years were destroyed.

G. WILDLIFE

2. Endangered and/or Threatened Species

Bald eagles constructed a nest at the southeast edge of Cattail Marsh late in the year. The nest is in a small (18 inch DBH) cottonwood tree adjacent to the refuge road which is closed to the public. Refuge activity will be curtailed in the area. This is the first eagle nesting activity noted on the Mark Twain Refuge.

Bald eagles were common on Delair throughout the winter months. The unit usually supported about six immatures and two adult eagles. Total use-days for the year was 476.

The northern harrier, listed as endangered in Illinois, was a common visitor to Delair.

3. Waterfowl

Use days for ducks and geese dropped from the record high of 1986. Large numbers of waterfowl did not arrive until late November.

Table G.3-1 summarizes waterfowl use for the year.

Wood duck production was estimated at 39 fledged ducks, down from 1986. Forty wood duck boxes are in place at Delair, and 28 of them were used by wood ducks.

Mallard production is estimated to be 34 fledged ducks. This is well below the objective level of 396, but is better than nothing, which was last year's production.

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebirds benefited from the dredge work on the Swan Lakes, which allowed a near complete drawdown. These birds were often found congregated on a mudflat near the inlet that remained wet all summer.

TABLE G. 3-1
MONTHLY WATERFOWL USE DAYS - CY 1987

<u>Month</u>	<u>Ducks</u>	<u>Geese</u>	<u>Total</u>
January	50,352	149,772	200,124
February	113,710	82,746	196,456
March	60,501	28,800	89,301
April	1,330	---	1,330
May	2,263	---	2,263
June	442	---	442
July	50	---	50
August	1,311	---	1,311
September	1,004	234	1,238
October	7,964	20,143	28,107
November	141,647	162,522	304,169
December	<u>183,215</u>	<u>94,373</u>	<u>277,588</u>
TOTAL	563,789	538,590	1,102,379
OBJECTIVE	2,000,000	500,000	

6. Raptors

Several raptor species are found on Delair. An increase in marshland habitat on the area has doubled northern harrier use since 1986. Bald eagle use continues to increase, as mild winters have reduced the length of freeze-up.

17. Disease Prevention and Control

Refuge staff inspected the area on a weekly basis and found no disease problems.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

A major ditch renovation project was completed by Hernandez Construction Company of Alton, Illinois. A backhoe was used to clean silt and debris from 31,000 feet of ditch at a cost of \$1.25 per linear foot. A Mudcat dredge was used to clean silt from 5,500 feet of ditch at a cost of \$4.67 per linear foot.

Spoil from the dredge operation was pumped to a containment basin on an agricultural field.



Mudcat dredge preparing to clean out ditches from Swan Lakes to the Sny. NRA, 3/87



Silt settling basin for dredge spoil from ditch
clean out. NRA, 3/87

The Sny Island Drainage District started a dragline at their Mississippi River pump station and cleaned the ditch beyond Upper Butcher outlet. The dragline is old and breaks down often. Sny officials predicted the machine would be a half mile beyond the refuge north boundary by August 1, but as of December 31, it was still 1/3 of a mile south of the north boundary and appeared to be in its death throws. Hopefully the Sny mechanics can revive this monster long enough to get it off the refuge.



The Sny Island Drainage District preparing to install replacement culvert in Lower Butcher Pond. NRA, 6/87

The ditch system should have optimum dewatering and flooding characteristics now. In addition to the ditching, the following facilities were renovated:

1. Hanei dike was raised and brush removed.
2. The pipe was replaced on the Hanei water control structure.
3. A pipe and slide gate was lowered 18 inches between Upper and Lower Swan Lakes to facilitate dewatering.
4. A 24-inch pipe was placed to divert water from the Garner Slough ditch to Lower Swan Lake.
5. The dike between Swan Lakes was raised.
6. A 36-inch pipe and slide gate was placed in the ditch 800 feet south of the main water control structure for Cattail Marsh. The pipe and slide gate will allow water to be diverted from Cattail Marsh to the South Marsh.
7. A 36-inch pipe replaced a plugged 18-inch pipe under the road in the ditch to the South Unit. This pipe will handle seep water from Cattail Marsh as needed.

8. A 36-inch pipe with slide gate was placed between the South Unit ditch and Lower Butcher. This pipe will enable dewatering of the South Unit through Lower Butcher.
9. The 36-inch pipe outlet for Lower Butcher was replaced.
10. The 48-inch pipe outlet for Upper Butcher was replaced.

Approximately 300 feet of the road at the southeast corner of Cattail Marsh needs to be raised $1\frac{1}{2}$ feet to allow maximum flooding of South Marsh. Raising the road will prevent water from flowing from Cattail Marsh across the road and into Swan Lake when diverting water to the South Unit.

J. OTHER ITEMS

4. Credits

Assistant Manager Bolander wrote Sections B.; F.2. and 9.; G.2., 3., 5., 6., and 17.

Manager Adams wrote Sections A.; F.4. and 10.; and I.

Secretary Watts typed, proofread, and assembled the report.

GARDNER DIVISION
MARK TWAIN NATIONAL WILDLIFE REFUGE
QUINCY, ILLINOIS

ANNUAL NARRATIVE REPORT
Calendar Year 1987

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

INTRODUCTION

The Gardner Division was formally established in 1958 as part of the Mark Twain National Wildlife Refuge under the Fish and Wildlife Coordination Act. The Division is General Plan land owned by the U.S. Army Corps of Engineers and is managed under a cooperative agreement signed by the U.S. Fish and Wildlife Service and the Corps in 1963.

The Gardner Division is 6,300 acres of river bottom mainland and 32 adjoining islands in the Mississippi River, Pool No. 21, about six miles upstream from Quincy, Illinois.

The Division contains 4,670 acres of mature bottomland hardwoods and 882 acres of croplands. Lakes, sloughs, and ponds existing on the area account for approximately 600 acres.

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A. HIGHLIGHTS

The equipment storage building located on Long Island was removed by the high bidder on the building.

Shotgun hunters killed 93 deer during the three-day special hunt.

Crop production was excellent with refuge share of soybeans yielding \$37,561.03

B. CLIMATIC CONDITIONS

Weather conditions were similar to Clarence Cannon's. There were no fall or spring floods. The river was low all summer and fall, restricting boat access to Long Lake, Indian Graves Lake, and other areas.

E. ADMINISTRATION

4. Volunteer Program

One volunteer donated 95 hours of time to monitor the soybean harvest on Long Island. Not only did this individual save the staff 95 hours of work, he saved them 50 hours of travel time to and from the refuge headquarters.

F. HABITAT MANAGEMENT

2. Wetlands

Water management efforts were seldom effective in the moist soil units on Long Island because of the porous soils. Therefore, the slide gates and stoplog structure were removed from the moist soil units and moved to Cannon.

4. Croplands

Cooperative farmers planted 720 acres of soybeans, 45 acres of corn and 3 acres of wheat. An aviation service aerially seeded 100 acres of wheat in soybean fields prior to leaf fall with excellent results. All crops produced well. Soybeans averaged 37 bushels per acre with refuge share after harvest costs totaling \$37,561.03. This money will be returned to the Mark Twain Refuge for resource management projects. There were no flood problems to contend with in 1987 whereas the October flood in 1986 destroyed all crops on the Division.

10. Pest Control

Cooperative farmers sprayed 720 acres of soybean ground with Prowl at a rate of 1 pound (active ingredient) per acre. Of the 720 acres, 605 acres were also sprayed with 2 ounces per acre of Scepter, 148 acres were treated post-emergent with 12 ounces of Basagran per acre and 3 ounces of Blazer per acre, Classic was used to spot treat 30 acres at $\frac{1}{2}$ ounce per acre and 180 acres were treated with 2, 4-D at 4 ounces per acre.

Forty-five acres of corn ground were sprayed with atrazine at 2 pounds per acre and 2, 4-D at 11 ounces per acre post-emergent.

G. WILDLIFE

2. Endangered and/or Threatened Species

Bald eagles are commonly seen on the Gardner Division between October and March.

3. Waterfowl

The refuge depends primarily on the Illinois National History Survey aerial censuses for waterfowl use data. Supplemental counts are conducted by refuge personnel when working on other projects on the Division. However, boat access to interior waters was restricted much of the year so the supplemental data are limited in value.

Aerial surveys show a general drop in waterfowl use from 1986.

8. Game Mammals

A three-day archery deer hunt was held in October. Of the 201 permittees, participation was light with only 25 to 30 hunters present on the third day. An estimated 10 deer were taken during the hunt. Most common hunter complaint was that they were not seeing nearly as many deer as in past years.

Permittees harvested 93 deer during the three-day shotgun deer hunt in November. A summary of the sex and age distribution of deer killed is below:

TABLE G. 8-1

Gardner Division 1987 Deer Harvest

Age:	$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}+$	Unk.	Total
Male	22	19	7	3	1	1	0	53
Female	11	6	7	2	2	7	5	40
Total	33	25	14	5	3	8	5	93

Permits Issued - 150

Hunter Success - 62%

10. Other Resident Wildlife

Deer hunters reported numerous turkey sightings on the Division. The Illinois Department of Conservation mapped all reported

sightings and all but two sightings in Adams County were on the Gardner Division.

H. PUBLIC USE

1. General

The Gardner Unit of the Division was open to fish and wildlife-oriented public use from February 1 through September 30. Squirrel hunting, fishing, wildlife observation, and mushroom hunting were popular activities in 1987 although use was limited to those with a boat or canoe to gain access to the islands. With the exception of special use trapping and the special deer hunt, the Unit was closed from October 1 through January 31 to serve as a sanctuary for waterfowl and bald eagles.

The Bear Creek Unit is open for public use year-round. Deer hunting was the most popular activity on the unit. Squirrel hunting, turkey hunting, and duck hunting were also popular along with fishing, pecan gathering, and wildlife observation.

6. Interpretive Exhibits/Demonstrations

A sign was erected at the entrance to the Bear Creek Unit identifying it as a Division of the Mark Twain National Wildlife Refuge. The Corps agreed to share their information kiosk in the campground and Outdoor Recreation Planner Bates prepared and displayed a map and public use regulations for the Division. Bates also developed a leaflet (copy attached) for the Division which was available to visitors at the Complex Office in Quincy and also from a leaflet dispenser in the campground.

8. Hunting

Waterfowl hunting is permitted on the Bear Creek Unit and the limited blinds are controlled by the Illinois Department of Conservation. Waterfowl hunting along the river in 1987 was slow because so few waterfowl were using the area.

Two hundred and one permits were issued for a three-day special archery hunt on the Gardner Unit. Turn-out was light perhaps in part because of the beautiful weather and in part because of a conflict with the televised world series baseball games.

One hundred and fifty permits were issued for the special shotgun hunt. Hunter success was 62 percent which was an improvement over the past two years.

10. Trapping

Special use permits were issued to two parties (total of four

individuals) to trap the waters of the Gardner Division (Long Island Lake excluded). One permittee reported poachers were removing animals from his traps and also setting traps in his permitted area. A check of the area indicated the problem had been resolved.

I. EQUIPMENT AND FACILITIES

8. Other

The excessed equipment storage building on Long Island was removed by the high bidder. He also took two fuel tanks and assorted junk as part of the package deal.

J. OTHER ITEMS

4. Credits

Assistant Manager Bolander wrote Sections B.; E.; and G.

Manager Adams wrote Sections A.; F.; H.; I.; and J.

Secretary Watts typed, proofread, and assembled the report.

MARK TWAIN NATIONAL WILDLIFE REFUGE

Brussels, Illinois

Calhoun, Batchtown and Gilbert Lake Divisions

ANNUAL NARRATIVE REPORT

Calendar Year 1987

U.S. Department of the Interior
Fish and Wildlife Service
National Wildlife Refuge System

REVIEW AND APPROVALS

MARK TWAIN NATIONAL WILDLIFE REFUGE

Brussels, Illinois

ANNUAL NARRATIVE REPORT

Calendar Year 1987

George W. Patton

Refuge Manager

2/29/88

Date

John R. Eadie

Mark Twain NWR
Project Leader Review

3/15/88

Date

Matthew A. Kerschbaum

Regional Office Approval

4-4-88

Date

John R. Eadie

4/4/88

INTRODUCTION

The Brussels District is the southernmost District within the Mark Twain National Wildlife Refuge Complex. The district presently includes 3 separate divisions and the Portage Island group, all totaling 8,229 acres: the Calhoun Division; 4,833 acres, the Batchtown Division; 2,428 acres, the Gilbert Lake Division; 736 acres and the Portage Island group; 232 acres.

The district functions as an important link in the chain of resting, feeding and wintering areas for birds migrating along the Mississippi Flyway. It was established in 1958 with General Plan Lands purchased by the Army Corps of Engineers for a navigation project. Lands excess to the requirements for the project came under U.S. Fish and Wildlife Service administration through a cooperative agreement between the Corps of Engineers and the U.S. Fish and Wildlife Service in 1963. April 9, 1979, additional acreage adjacent to the Calhoun Division (56 acres) was purchased for the establishment of a new office and maintenance facilities.

The Calhoun Division is located a few miles north of the confluence of the Mississippi and Illinois Rivers in Calhoun County, Illinois and is approximately 20 air miles north of St. Louis, Missouri. The division consists of agricultural lands, timbered areas, moist soil units, lakes, ponds and sloughs.

The Gilbert Lake Division is also located along the Illinois River in Jersey County, Illinois, a few miles north of the same confluence. The division consists of a narrow 250 acre lake bordered by timber, small agricultural areas and a smaller section of native grasses.

The Batchtown Division is located along the Mississippi River, 5 miles north of lock and dam #25 in Calhoun County, Illinois. Timbered lands, backwater sloughs, agricultural lands, lakes, ponds and a moist soil unit can all be found within the division.

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A. HIGHLIGHTS

No floods on the district during the year. (Section F.2).

Record snowfall in January. (Section B).

Development of Sago pondweed and coontail in Swan Lake continues (Section F.2)



Office and Visitor Center after major snowfall in January. DK

B. CLIMATIC CONDITIONS

The year began with a record snowfall in January. Over 18.5 inches of snow fell on weekdays throughout the month. The refuge weather station is not monitored on weekends or holidays but snowfall for the nearby city of St. Louis for January was 21 inches.

Our white winter was followed by a warm spring and an early summer. High humidity and temperatures were common May through August with heat indexes of 100°F - 114°F throughout July and August. Warm daytime temperatures remained through September and October with the first frost occurring on October 8th. A mild fall ended with cool December temperatures and a blizzard on December 14th. An additional 12 inches of snow was recorded for December.

Recorded rainfall for 1987 was nearly identical to that of last year: 1987; 34.59 inches, 1986; 34.65 inches. With the exception of a couple occasions, the local state managed ferry operated all year.

1987 Weather Summary

Month	Temperature °F			Precipitation (inches)		
	<u>Max.</u>	<u>Min.</u>	<u>Ave.</u>	<u>Rainfall</u>	<u>Normal Rain</u>	<u>Snowfall</u>
January	58	-10	29	1.18	1.85	18.5
February	67	16	38.4	1.37	2.28	
March	77	22	46.8	2.30	3.34	
April	94	24	57	2.74	3.71	
May	94	49	71	1.83	4.06	
June	100	55	77.7	1.86	4.04	
July	101	58	80.7	3.86	3.32	
August	107	56	80.62	6.42	2.94	
September	93	48	68	2.37	3.15	
October	80	26	52.4	1.45	2.64	
November	82	16	49.36	4.78	2.64	
December	60	13	38.24	4.43	2.20	12
Totals				34.59	36.64	30.50

D. PLANNING

2. Management Plan

Parts I, II and III of the Refuge Management Plan were completed by the refuge staff and was approved by the Quincy Office, RF-2 Area Biologist and the Regional Office.

3. Public Participation

A public meeting was held on February 7 to take comments on the proposed refuge trapping plan. Fifty one people attended the meeting with fifty being in favor of trapping. Twenty one sets of written comments on the trapping program were also sent into the Refuge Office.

Refuge personnel met and corresponded with members of the Migratory Waterfowl Hunter's Association and the Great Rivers Chapter of the Illinois Audubon Society to discuss the management of the refuge.

6. Other

The Refuge Marsh, Water and Moist Soil Management Plan and Search and Rescue Plans were written up by the refuge staff and were approved by the required officials in the Quincy and the Regional Offices. A Refuge Cropland Management Plan and a Trapping Plan were written up by the refuge staff and sent in for review by the RF-2 Biologist and Quincy staff. They are now being revised by the refuge staff to be resubmitted.

E. ADMINISTRATION

1. Personnel

No staff changes occurred during 1987. A 5 year comparison of onboard strength is given below.

	<u>Permanent Number of Employees</u>		<u>Temporary</u>	<u>Total FTE's</u>
	<u>Full Time</u>	<u>Part Time</u>		
FY 1987	3	1 (3 days/wk)	0	3.6
FY 1986	3	1 (3 days/wk)	0	3.6
FY 1985	3	1 (3 days/wk)	0	3.6
FY 1984	3	1 (3 days/wk)	0	3.6
FY 1983	3	1 (3 days/wk)	0	3.6

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FY 1983	3	1 (3 days/wk)	0	3.6

Personnel

1. George W. Peyton	Refuge Manager	GS-11 PFT EOD 8-14-77
2. Debra L. Kimbrell	Assistant Refuge Manager	GS-7 PFT EOD 3-19-85
3. Debra D. Kuhn	Secretary	GS-4 PPT EOD 7-21-83
4. Eugene A. Simon	Maintenance Mechanic	WG-9 PFT EOD 12-29-65
5. Robert H. Bleitner	YCC	6-8-87 - 7-25-87

Volunteers

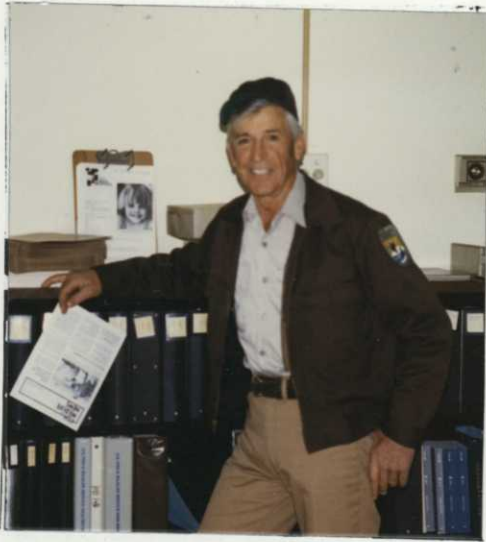
1. Lisa Brasington	14. Hillary McConnell
2. Neil Claussen	15. Dan Martin
3. Lois Davis	16. Marla Martin
4. Mildred Davis	17. Dorothy Metzger
5. Mary Margaret Doak	18. Irene Mondhink
6. Tanner Girard	19. Elizabeth Oleson
7. Kendra Hall	20. Sarah Perkins
8. Melissa Herter	21. Ralph Shook
9. Gilbert Ives	22. Jim Twitchell
10. Georgia Ives	23. Sandy Wood
11. Rachelle Kimbrell	24. Erma Worthey
12. Bill Lorenzen	25. Helen Wuestenfeld
13. Chris MacDonald	



1



2



3



4



5

1. George Peyton, Refuge Manager
2. Debra Kuhn, Secretary
3. Eugene Simon, Maint.-Mechanic
4. Debra Kimbrell, Asst. Ref. Mgr.
5. Bob Bleitner, YCC

2. Youth Programs

Nineteen applications were received (13 male and 6 female) for the single Brussels District YCC position. The YCC enrollee began work June 8th and resigned July 25th to take another job. Projects accomplished are as follows:

- | | |
|-----------------------------------|-----------------------------|
| -vegetation transects | -tree/shrub survival survey |
| -facility and vehicle maintenance | -litter pick-up |
| -lawn care | -painting |

Both safety and environmental concerns related to each project were discussed prior to and during each project.

Discussion

- | | |
|----------------------------------|--------------------------|
| -National Wildlife Refuge System | -Wildlife diseases |
| -Wildlife management | -Habitat importance |
| -YCC program | -Moist soil units |
| -Migratory birds | -Environmental education |
| -Loss of wetlands | -Pollution |
| -Conservation | -Public attitudes |
| -Hunting | -Flooding |
| -Plant and bird identification | |

Films/Slides/Video

- | | |
|--------------------------------|-----------------------------|
| "When Teenagers Drive" | "Our Nation's Wetlands" |
| "I Believe In Me" | "Duck Stamp Program" |
| "To Catch A Cloud" | "We Care About Eagles" |
| "Faces In Crashes" | "Save A Place For Wildlife" |
| "Disaster Before It Hits Home" | "Refuge Management" |
| "Personal Flotation Devices" | |

4. Volunteer Program

The focus of the volunteer program for 1987 was on providing additional opportunity for the public to use the visitor center and obtain needed information. This was accomplished by opening the center on weekends during the spring and fall. An additional 32 days of visitation were offered by doing this during 1987. A volunteer staff of 25 individuals worked to make this and other projects possible.

Volunteer efforts are concentrated in the spring and fall months due to spring and fall bird migrations and public interest. Interest, hence visitation is often limited throughout the year due to restricted access to the refuge. During periods of flooding, fog or freezing conditions, ferry operations to and from the peninsula are shut down and many visitors and volunteers must drive an additional hour to reach the refuge.

Volunteer efforts however were not limited to reception type duties. Helen Wuestenfeld, a long standing volunteer of over 16 years and Dr. Tanner Girard, wildlife professor at Principia College and President of the Illinois Audubon Society, contributed numerous hours coordinating volunteer projects, leading tours and participating in wildlife censuses.

Members of Migratory Waterfowl Hunters Inc. have also assisted refuge staff in habitat manipulations on one of the refuge moist soil units.

5. Funding

Funding for Brussels in 1987 totaled \$175,670. O & M funding amounted to \$113,000 with salaries accounting for 84%. A funding activity breakdown and a six year comparison chart are listed below.

	<u>O & M</u>	<u>YCC</u>	<u>REVOLVING REHABILITATION</u>	<u>ARMM</u>	<u>BLHP</u>	<u>8260</u>	<u>TOTAL</u>
1987	\$113,000	\$1,770		\$54,900		\$6,000	\$175,670
1986	\$107,500	\$7,500		\$ 7,000		\$5,214	\$127,214
1985	\$124,200	\$7,500		\$18,200		\$1,530	\$151,430
1984	\$ 99,000			\$69,000		\$8,209	\$176,209
1983	\$ 90,000						\$ 90,000
1982	\$ 80,000		\$6,000		\$21,550	\$1,000	\$108,550

6. Safety

Refuge personnel met monthly to discuss pertinent safety topics and view related films. Films viewed throughout the year are listed below.

- | | |
|----------------------------------|--|
| - "It's Up To You" | - "Faces In Crashes" |
| - "Escape" | - "Water Safety Test" |
| - "Contact" | - "A Shade Of Difference" |
| - "The Final Factor" | - "Motorcycle Safety And
Courtesy In Traffic" |
| - "A Question Of Attitudes" | - "Tire Hydroplaning" |
| - "Disaster Before It Hits Home" | - "Marijuana, Driving And You" |
| - "Personal Flotation Devices" | |
| - "Reason To Live" | |

January 29th Refuge Manager Peyton, Assistant Refuge Manager Kimbrell and Maintenance Mechanic Simon passed the required pre-burn step-tests held at the County Health Department office.

Safety inspections of refuge facilities were conducted quarterly by refuge staff and during a station inspection June 4th. The following safety items were brought to the attention of refuge staff subsequent to the station inspection.

- Recommend Station Safety Officer attend a meeting of the St. Louis Federal Safety Council on a semi-annual basis to obtain local training sources (such as Occupational Safety and Health Administration Col-lateral Duty), film sources, safety equipment suppliers and other safety program support opportunities.
- It is recommended that annual visits by the local fire department be requested for information and inspection purposes.
- Portable radio units should be repaired or replaced.
- Audiometric testing and hearing conservation program should be initiated in accordance with 24 AM 8.
- Spring binders should be disposed of in accordance with Safety Notice dated 4/15/87.
- Approved flammable liquid storage cabinet should be provided for chemicals which are not compatible with flammable liquids.
- The grinder needs a tongue guard and shields.
- Fixed or pull down stairs should be provided for a safe means of access to the loft. If not available locally, the Division of Safety, or Division of Engineering should be contacted for assistance.
- An exhaust fan should be provided for the shop. Type, size, and location should be coordinated through the Division of Engineering. A parts cleaner should be provided for the shop.
- The use of Naptha should be eliminated due to fire and health hazards. Recommend replacement with standard safety solvent for parts cleaner.
- Protective posts should be installed at the gas pump area.
- Place reflective tape on all gates not visibly marked with signs or other highly reflective material.
- Place stop sign at intersection of Route 1 and fishing access road.

Several purchases and changes were made to bring the station up to current safety standards:

- baseline audiometric testing was accomplished
- spring binders were replaced with those recommended by the safety office.
- a flammable liquid storage cabinet was purchased
- the solvent naptha was replaced with an approved solvent
- a fuel pump protection barrier was installed

- reflective tape was placed on refuge pole gates
- an exhaust fan for the shop area was ordered and will be installed by a local contractor.
- trustees of the Point Volunteer Fire Protection District toured refuge facilities to familiarize them with possible hazards should they need to respond to a refuge fire.

Following a check of station fire extinguishers, several extinguishers were found in need of replacement or recharging. Correcting this became quite a chore when shipments were repeatedly received with the extinguishers having discharged during shipping. After several returns, station personnel accepted a shipment with only 1 extinguisher discharged and considered the subject closed.

During the month of July, a new hearing protection program was implemented and on August 19th baseline audiometric testing of appropriate station personnel was accomplished. Testing will continue on an annual basis.

Assistant Manager Kimbrell completed a USCG Auxillary boating safety course August 20. (Other staff members attended a course offered in 1986).

No lost time accidents occurred during the year bringing the cumulative total hours worked since the last lost time accident (7-1-81) to 47,705.

7. Technical Assistance

A mourning dove call survey was conducted on a route through Greene County by the Refuge Manager. Manager Peyton and Assistant Manager Kimbrell met with Bob Stratton of the Quincy Headquarters and personnel from the St. Louis Corps of Engineers, Missouri Department of Conservation and the Illinois Department of Conservation to discuss the management of General Plan lands on pools 25 and 26 of the Mississippi River.

Manager Peyton met several times with Fish and Wildlife Service personnel, and representatives from the Illinois and Missouri Departments of Conservation to discuss Environmental Management Program Plans.

8. Other Items

Refuge personnel completed the following training:

<u>Staff</u>	<u>Training</u>	<u>Location</u>	<u>Dates</u>
George Peyton	L.E. Refresher	Springfield, IL	March 30 - April 3
Debra Kimbrell	Admin. Workshop	Minneapolis, MN	March 3 - March 6
	L.E. Refresher	Springfield, IL	March 30 - April 3
	USCG Boating Safety	Hardin, IL	June - August
	Disease Workshop	Fargo, ND	Sept. 1 - Sept. 3
	Retirement Wkshp.	Columbia, MO	October 20
	Public Use	DeSoto NWR	Oct. 26 - Oct. 30
Debra Kuhn	Retirement Wkshp.	Columbia, MO	October 20
	Def. Small Purchase	Correspondence Course	March 6

F. HABITAT MANAGEMENT

1. General

Mississippi and Illinois River levels were unusually low throughout 1987, possibly due to the construction of a new lock and dam #26. As a result, no flooding within the district due to river overflows occurred during 1987. This was the first such occurrence in many years. Cooperative farmers got off to an early start as most refuge lands were sufficiently dry for soil manipulations by March. Rainfall was the only natural deterrent to operations and dry periods were again sufficient in the fall for normal harvesting and soil manipulations.

2. Wetlands

a) Swan Lake

Swan Lake remains a shallow body of water with an average depth of less than 2 ft. Silt deposition from previous years flooding and erosion of nearby lands continue to add to the silt problem. On September 24th silt was removed from the ditch between Swan Lake and the pump station to improve water flow prior to pumping into the moist soil units in September. Then in October the dike between Swan Lake and moist soil unit #1 was raised.

During May and October willow and maple trees growing along lake edges received an aerial application of rodeo herbicide (see sec. F.10).

The Fisheries Biologist for RF-2 sampled Swan Lake fish populations during March and October. Attempts were made to collect samples during the summer however access was impossible due to low water levels (see sec. G.11). A second study to evaluate fish populations and water quality was also initiated during 1987 (see sec. G.11).

Sago pondweed (Potamogeton pectinatus) was once common on Swan Lake and then disappeared around 1969-70. In 1985 the vegetation was observed on the SE end of the lake. The vegetation has continued to develop, covering an increasingly greater surface area each year.

Small amounts of coontail (Ceratophyllum demersum) were found growing with the pondweed and duck weed (Lemna spp.) rafting atop the pondweed. Duck and other bird use of the vegetated area in the fall has been high.



SE section of Swan Lake showing Sago Pondweed (dark green), Duckweeds (light green) and Algae (bright green). DK

A small area SW of the Six Mile Island cut has been receiving high use by pelicans, ducks, shore and water birds (see illustration A).

b) Moist Soil Units

1. Water Manipulations And Management

Moist Soil Unit #1

The dominant vegetation developing in the northern portion of the unit was Polygonum coccineum and other Polygonum species. Button-bush (Cephalanthus occidentalis) was prominent along ditch edges and coontail (Ceratophyllum demersum) and water primrose (Jussiaea sp.) within the ditches.

The drier southern portion of the unit was disked, followed by seeding with buckwheat July 31 - August 3. Pumping into the unit began September 28, continued through October 1 and was repeated October 26 - 30. Approximately 12,870,000 gallons (1,716,000 cu. ft.) were pumped in 71.5 hours. Water remained on the unit through November and December. The entire area froze around December 14th with the onset of a storm.

The moist soil unit received good use by both blue-snow and Canada geese and moderate use by ducks. Primary use was within the ditch

and an area south of the ditch running NE and SW. Greatest use by waterfowl occurred during November when geese alternated between moist soil units #1, #2, #5 and adjacent crop fields. Use prior to this time was sporadic.

Moist Soil Unit #2

The dominant vegetation within the unit appeared to be Polygonum coccineum. However, ditches had dense growths of coontail and water primrose and ditch banks had several species of Polygonum other than P. coccineum.

August 5th moist soil unit #2 was disked followed by planting of Japanese millet. August 20th the millet was up and doing well. Pumping into the area began November 9 - 10 and was repeated November 12 - 13. Approximately 10,980,000 gallons (1,464,000 cu. ft.) were pumped during 61 hours. Water remained on the unit through November and December.

Primary use was by geese (both blue-snow and Canada geese) in November. Use was concentrated in and near the ditch running north - south. Use by ducks was mainly mallards and extended throughout the unit. Moist soil unit #2 also received good use by several species of water birds throughout the spring and summer (use was restricted to the ditch during dry periods).

Moist Soil Unit #3

August 5th moist soil unit #3 was disked followed by planting of Japanese millet. As of August 20th the millet was up and doing well. However the millet never matured. No pumping into the unit occurred in 1987.

Following heavy rains in December, the unit received some use by blue-snow geese as a resting area.

Moist Soil Unit #4

Moist soil unit #4 held several inches of water January through April then quickly began to dry out. For the first time in several years the unit completely dried and a dense stand of cocklebur resulted. August 20th the cocklebur was mowed.

The trees along the eastern edge of the unit received an aerial application of rodeo on May 5th (2.75 qts./Ac.). Results were very spotty with minimal kill.

The unit received good use during the spring months by waterfowl (primarily mallards and pintails), water birds, white-tailed deer and other wildlife.

Moist Soil Unit #5

Dominant vegetation developing along the north - south running ditch

and 50 feet west was millet, several species of Polygonum (other than P. coccineum) and Cyperus spp. Farther west P. coccineum was prevalent.

The entire unit was disked and planted with buckwheat August 3rd. As of August 20th the buckwheat had sprouted and was doing well. November 12th - 13th, some of the water being pumped into moist soil unit #2 was diverted into moist soil unit #5.

The unit received good use during January, February and November by blue-snow and Canada geese. Waterfowl use was concentrated along the northern half of the unit.

Office Moist Soil Unit

Square meter sampling within the moist soil unit transects yielded the following information:

<u>Most frequently encountered species</u>	<u>% of total samples</u>
1. <u>Cyperus</u> spp.	66.60
2. <u>Polygonum coccineum</u>	61.10
3. <u>Gramineae</u> species (includes millet)	51.85
4. <u>Xanthium pennsylvanicum</u>	42.59
5. small morning glory species	37.03
6. <u>Cassia fasciculata</u>	29.63
7. unknown #16	25.93
8. unknown #14	24.07
9. <u>Polygonum</u> spp. (other than <u>P. coccineum</u>)	20.37
10. <u>Campsis radicans</u>	20.37
11. <u>Ambrosia trifida</u>	20.37
12. large morning glory species	16.66
13. unknown #15	16.66
14. <u>Chenopodium album</u>	14.81
Other species: \leq 1.85 - 12.96%	

April 29th a prescribe burn was conducted on the Office moist soil unit (excluding the transects). Due to high moisture content within vegetation, only 50% of the area burned. May 5th maple, cottonwood and willow trees within the moist soil unit were aerially sprayed with rodeo herbicide (2.75 qts./Ac). In late August a strip running north - south through transects 9 and 10 and a strip parallel to the northern border was mowed. Pumping into the unit began October 28th and ended October 30th. A few inches of water remained on the NE quarter of the unit through November and December.

Waterfowl use of the unit was minimal. Occasional use by 2-7 ducks occurred during the spring and Canada geese were observed resting within the unit on 3 occasions (2 groups of 30 in the fall and 1 group of 125 January 16th).

c) Schoolhouse Lake

Schoolhouse Lake rests along the eastern edge of the maintenance road

leading to the Swan Lake pump station, south of moist soil unit #2. The label of "lake" is a misnomer as the area does not typically hold water year-round. Presently there is no practical water control on the area. Primary vegetation within Schoolhouse Lake has been Polygonum coccineum and willows, however bulrush (Scirpus sp.) was noted this year. When the area is flooded (due to precipitation or retreating floodwaters) high use by great-blue heron, egrets and other water birds has been observed.

During May, willow vegetation on the north and northeast portion of the unit was sprayed with rodeo herbicide. Results of the spraying were spotty.

d) Goose Pasture

-This unit was disked and planted with wheat in early fall. Wheat development was good with some use by waterfowl and deer.

3. Forests

Three hundred and sixty five pin oak seedlings which were received from the Illinois Department of Conservation were planted on the Calhoun Division.

4. Croplands

This was the first year in several years that the weather cooperated with the refuge farmers in the planting, growing and harvesting of their crops. Five cooperative farmers farmed 738 acres; 217 acres of corn, 117 acres of wheat, 398 acres of soybeans and 6 acres of millet. Waterfowl foods left in fields amounted to 13,529 bushels of standing corn, 2,038 bushels of waste corn following the harvest, 322 bushels of waste soybeans following harvest, 131,625 pounds of wheat browse and 120 bushels of millet.



In addition to the food provided for waterfowl 308.96 bushels of soybeans were harvested and taken to the elevator to be sold. The proceeds (\$1,592.48) from this sale were deposited in the 5092 special account.

5. Grasslands

Native grasses once common to the area: indian grass (Sorghastrum nutans), little bluestem (Andropogon scoparius), big bluestem (Andropogon gerardi), and switch grass (Panicum virgatum), were planted around refuge buildings soon after the construction of the new facilities in 1980. These four species have done remarkably well and provide shelter for several upland wildlife species.

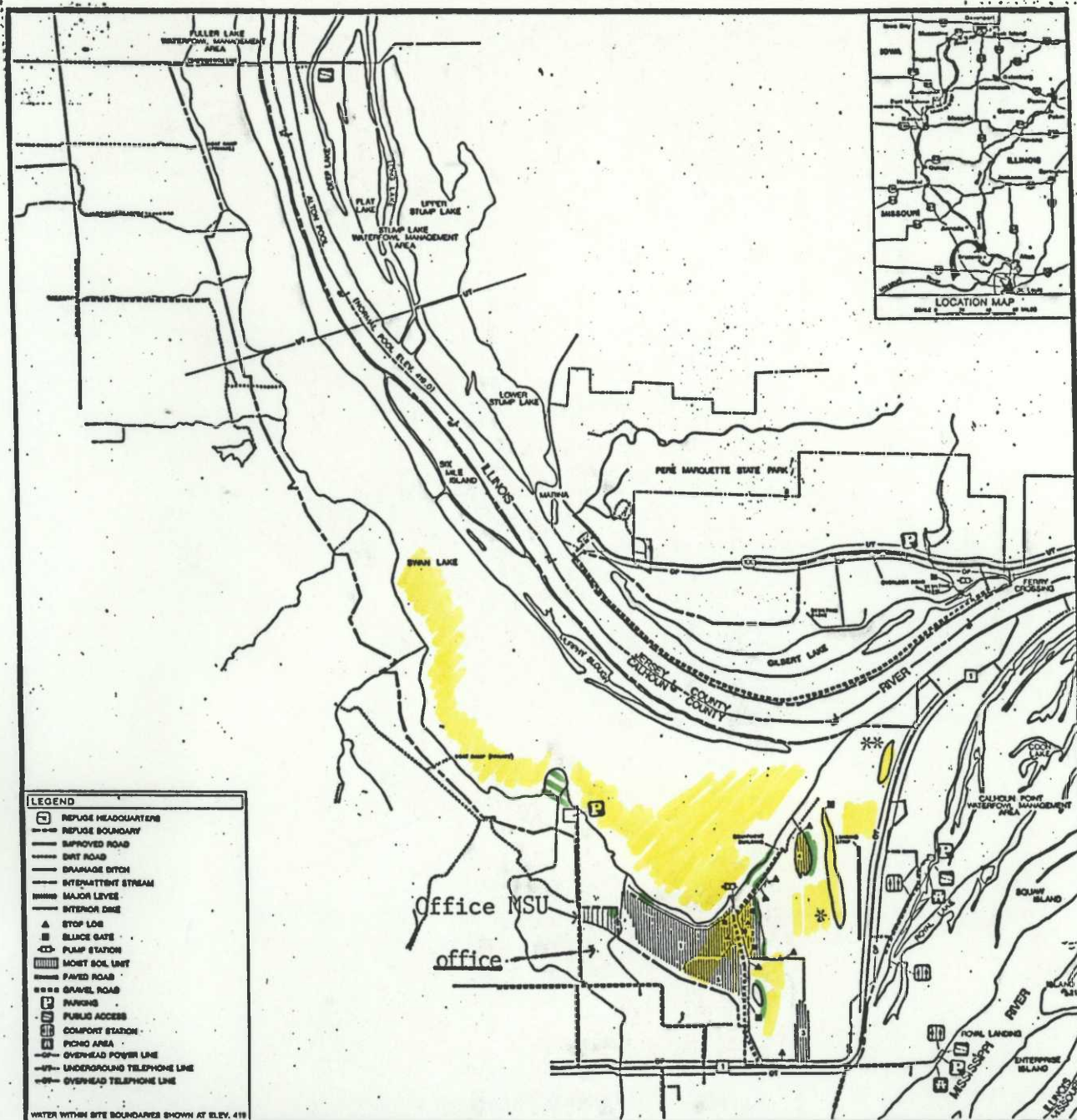
9. Fire Management




Burn permits were received and the station burn plan was revised and updated. A prescribe burn was accomplished on the western portion of the Office moist soil unit during April. Results were fair to good considering the moisture content of the vegetation.



Control burn on Office Moist Soil Unit

DK



-  Known Primary Waterfowl Use Areas 1987 * Yorkinut Lake
 Herbicide Spray Areas 1987 ** Duck Pocket
 High Use Area; Pelicans, Water Birds And Ducks

EXISTING DEVELOPMENT/ROAD & UTILITY CALHOUN / GILBERT LAKE DIVISIONS

MARK TWAIN NATIONAL WILDLIFE REFUGE
U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR



ILLUSTRATION A

10. Pest Control

The following is a summary of herbicides used on the Calhoun District* during 1987.

Chemical	Target Pest	Acres Treated	Amount Applied	Application Rates
Atrazine	#2, 4	45	48 lbs.	1-2 lbs. A.I./Acre
Basagran	#2	*132 ⁺	*79.5 lbs.	.5-1 lb. A.I./Acre
Butyrac	#2	25	3.125 lbs.	2 oz. A.I./Acre
Lasso	#2	744.5	1,634.95 lbs.	.8-2.5 lbs. A.I./Acre
Lorox	#2	55	55 lbs.	1 lb. A.I./Acre
Lorox DF	#2, 4	1.5	.495 lb.	.33 lb. A.I./Acre
Rodeo	#3	85	92.25 qts.	2.75 qts. A.I./Acre
Roundup	#1	**	**	3 lbs. A.I./Acre
Treflan	#1, 2	18	27 lbs.	1.5 lbs. A.I./Acre
Treflan EC	#1, 2	9	9 lbs.	1 lb. A.I./Acre

#1: Johnson grass

#2: Cocklebur, morning glory, smartweed and other broadleaf weeds

#3: Willow, cottonwood and maple

#4: Foxtail and other grasses

*Used for spot treatment (usually 1 acre or less) in addition to the acres noted

**Used for spot treatment only

The majority of herbicides listed were used in the farming program. Included in the summary however, is rodeo, the herbicide used in the aerial spraying of willow, maple and cottonwood trees on all 3 divisions (see illustration A).

Approximately 21 acres on Calhoun and 14 acres on the Gilbert Lake Division, were sprayed with Rodeo by W.L.S. Flying Service (2.75 qts./Ac.) on May 5th. Results were spotty, ranging from good to no kill. An additional 50 acres of willows and maples on the Calhoun and Batchtown Divisions were aerially sprayed with Rodeo (2.5 qts./Ac.) October 1st. Results have not been determined.



Application of Rodeo herbicide on willows by WLS Flying Service. GP

G. WILDLIFE

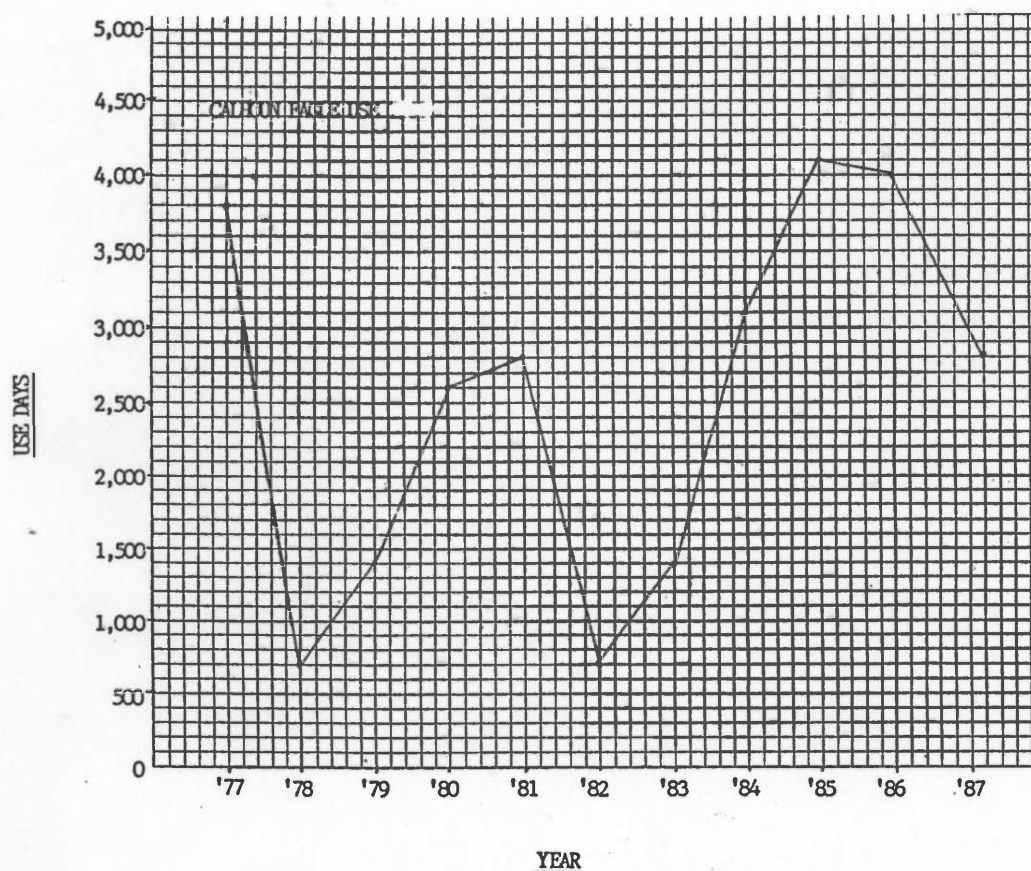
1. Wildlife Diversity

The Calhoun District utilizes various programs to provide diverse habitats for as many different species of wildlife as is possible. The farming and moist soil unit programs provide differing food and shelter resources for many species of waterfowl, water and shore birds, upland birds, passerine species, white-tailed deer and other mammals. Additionally, native grasses, riparian habitat, lakes, ponds and sloughs provide resources to numerous other wildlife.

2. Endangered And/Or Threatened Species

Considerably fewer bald eagles than in past years were observed on the District during the fall and winter months of 1987. Environmental conditions locally were not favorable for eagle use particularly during December.

	<u>Christmas Count</u>			<u>Eagle Census</u>			
	<u>1987</u>	<u>1986</u>	<u>1985</u>	<u>1988b</u>	<u>1988a</u>	<u>1987</u>	<u>1986</u>
Adult	13	50	34	117	15	65	94
Immature	13	29	29	117	16	40	36
Unknown	<u>0</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>9</u>
	26	79	65	234	32	105	139



Conditions at nearby lock and dams however were very favorable with open water available and large concentrations of waterfowl present. Alton dam (lock and dam 26) was found to be holding 157 bald eagles and Winfield dam (lock and dam 25) 80 eagles.

As soon as local conditions changed however, eagle concentrations on the district increased significantly with 234 eagles observed on the area and 32 additional eagles in flight over the area during a January 1988 census.

The ratio of immatures to adults observed in general and during 1987 - 1988 is worth noting as an unusually high number of immature observations was documented.

Observations by division are as follows:

	<u>Calhoun</u>		<u>Gilbert Lake</u>		<u>Batchtown</u>	
	<u>1/87</u>	<u>12/87</u>	<u>1/87</u>	<u>12/87</u>	<u>1/87</u>	<u>12/87</u>
Adult	6	7	32	1	27	5
Immature	8	6	16	3	16	4
	<u>14</u>	<u>13</u>	<u>48</u>	<u>4</u>	<u>43</u>	<u>9</u>

Several species of birds listed by the state of Illinois as endangered or threatened are known to use the refuge. A list of these birds follows with an asterisk identifying birds observed on the district during 1987.

Endangered

- | | |
|----------------------------|-----------------------------|
| -*Cooper's hawk | -*Little blue heron |
| -*Northern harrier | -*Black-crowned night heron |
| -*Red-shouldered hawk | -*American bittern |
| -*Osprey | -*Least bittern |
| -*Peregrine falcon | -Sandhill crane |
| -Mississippi kite | -Yellow rail |
| -*Bald eagle | -*Pied-billed grebe |
| -*Sharp-shinned hawk | -Piping plover |
| -Long-eared owl | -Wilson's phalarope |
| -Short-eared owl | -*Forster's tern |
| -*Double-crested cormorant | -Common tern |
| -*Great egret | -Least tern |
| -Snowy egret | -Black tern |

Threatened

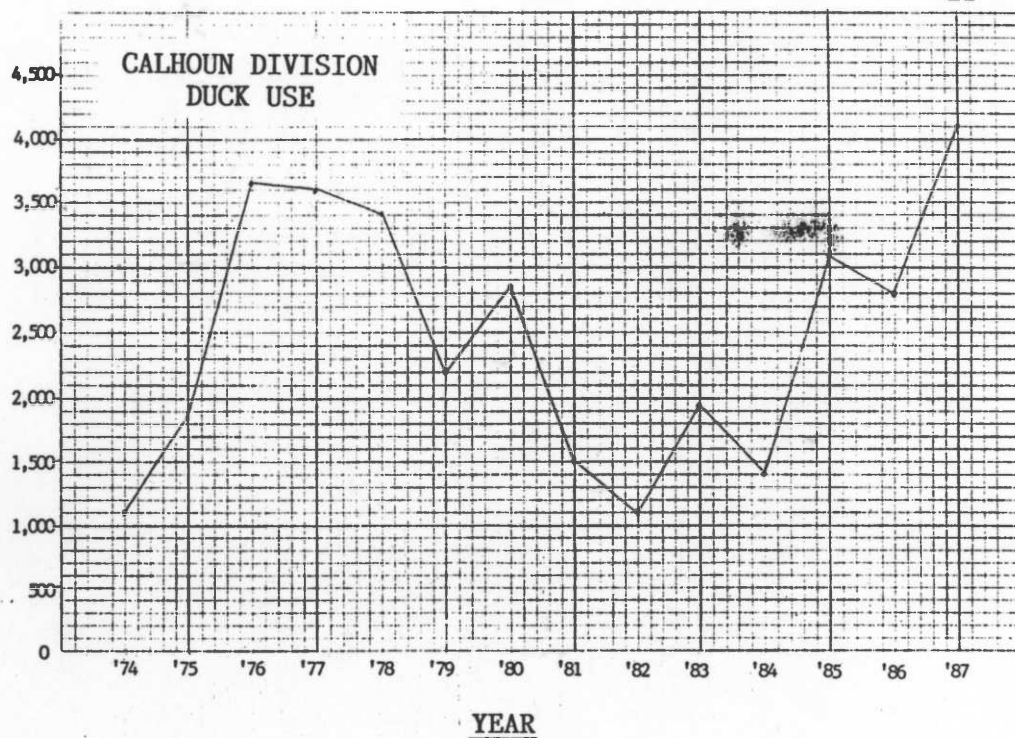
- | | |
|--------------------|----------------------|
| -Common gallinule | -*Brewer's blackbird |
| -Veery | -*Brown creeper |
| -Loggerhead shrike | |

3. Waterfowl

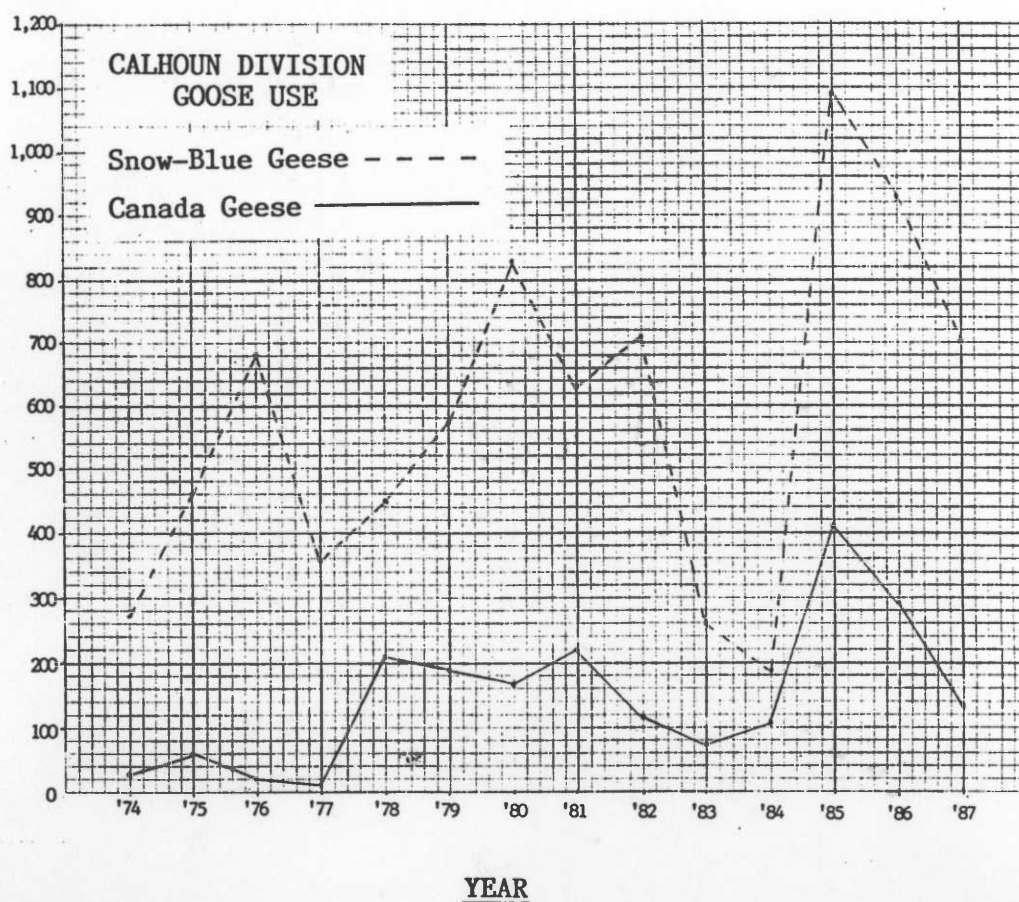
Mallards and wood ducks are present in small numbers year round, increasing as fall and spring migrating birds reach the area. Blue-winged teal are the first fall migrants arriving in early September with mallards, green-winged teal, pintail and widgeon close behind. Other species arriving in lesser numbers in September include shovelers, gadwall, ruddy ducks and buffleheads. Waterfowl numbers steadily increased in October with the primary duck species present being mallards, widgeon, pintail and gadwall. Scaup, ring-necked ducks, canvasbacks and redheads first appeared in October and reached peak concentrations in November.

Duck numbers overall peaked in November (92,668 birds) with mallards holding the lead and widgeon, pintail, scaup, gadwall and ring-necked ducks major contributors. Common goldeneye, common and hooded mergansers were also first observed in November. Temperatures dropped sharply

USE DAYS IN THOUSANDS



USE DAYS IN THOUSANDS



in December with duck concentrations following suit.

A few Canada geese and 6 snow-blue geese remained in the area throughout 1987, surprising birders during the summer months. The first Canada geese migrants however, were observed in September and snow-blue geese in October. Among the Canada geese were a couple of unusually marked birds. One reportedly had enlarged white check patches and a large white patch on it's back. The second was apparently an albino.

Canada geese populations reached a peak in November with an estimated 2,300 birds, followed by snow-blue geese in December with 15,000 birds. Populations of both species declined after reaching their respective peaks but remained in fair numbers on into the new year.



Waterfowl using Moist Soil Unit #4.

DK

Use of the Calhoun Division by both ducks and geese was fairly widespread this year with moist soil units, lakes, ponds and fields all receiving attention. Although fairly large concentrations of geese and ducks could usually be observed on Swan Lake throughout the fall and winter months, moist soil units 1 and 5 received heavy use in November and Yorkinut Lake, moist soil unit 4 and crop fields throughout November and December. Duck pocket, a small "greentree reservoir" area, also received good use by ducks and Canada geese late in December and on into 1988. Use days are estimated at 4,112,809 for ducks and 837,468 for geese (703,278; snow-blue geese, 134,190; Canada geese).

In an effort to increase wood duck production on the District a joint project between Migratory Waterfowl Hunters Inc. and refuge staff was initiated with the donation of 10 metal wood duck nest boxes by the sports club. Three of the 10 boxes were later installed on the Calhoun Division by refuge staff.



Donation of wood duck boxes by Migratory Waterfowl Hunters, Inc. Staff

Production estimates for mallards and wood ducks on the Calhoun Division are: 250 wood ducks and 100 mallards. Installment of nest boxes occurred well into the nesting period hence, use if any is not expected to be high. Boxes have not as yet been checked.

4. Marsh And Water Birds

With no seasonal flooding from local rivers and an average amount of rainfall throughout the year, very few seasonal wetland areas existed for marsh and water birds. Except for periods immediately following heavy rainfall, use was primarily along Swan Lake and within a few ditches during the spring and summer months. In the fall pumping into moist soil units provided additional habitat.

The greatest concentrations of egrets and great blue herons occurred, as in past years, during late summer and early fall. Cormorants however, were abundant throughout the fall and into the winter. Numbers of most water birds were down from the record numbers of 1986 but close to that

of previous years: great blue herons; 150, common egret; 200, double-crested cormorant; 100, great egret; 102. Use days for the more common species within this group was estimated to be 65,750.

Although an occasional white pelican observation was common on the Calhoun Division, only in recent years have observations of 75-90 birds been a regular occurrence. This year 90 birds were again observed on Swan Lake, arriving in September and last observed in November.

5. Shorebirds, Gulls, Terns And Allied Species

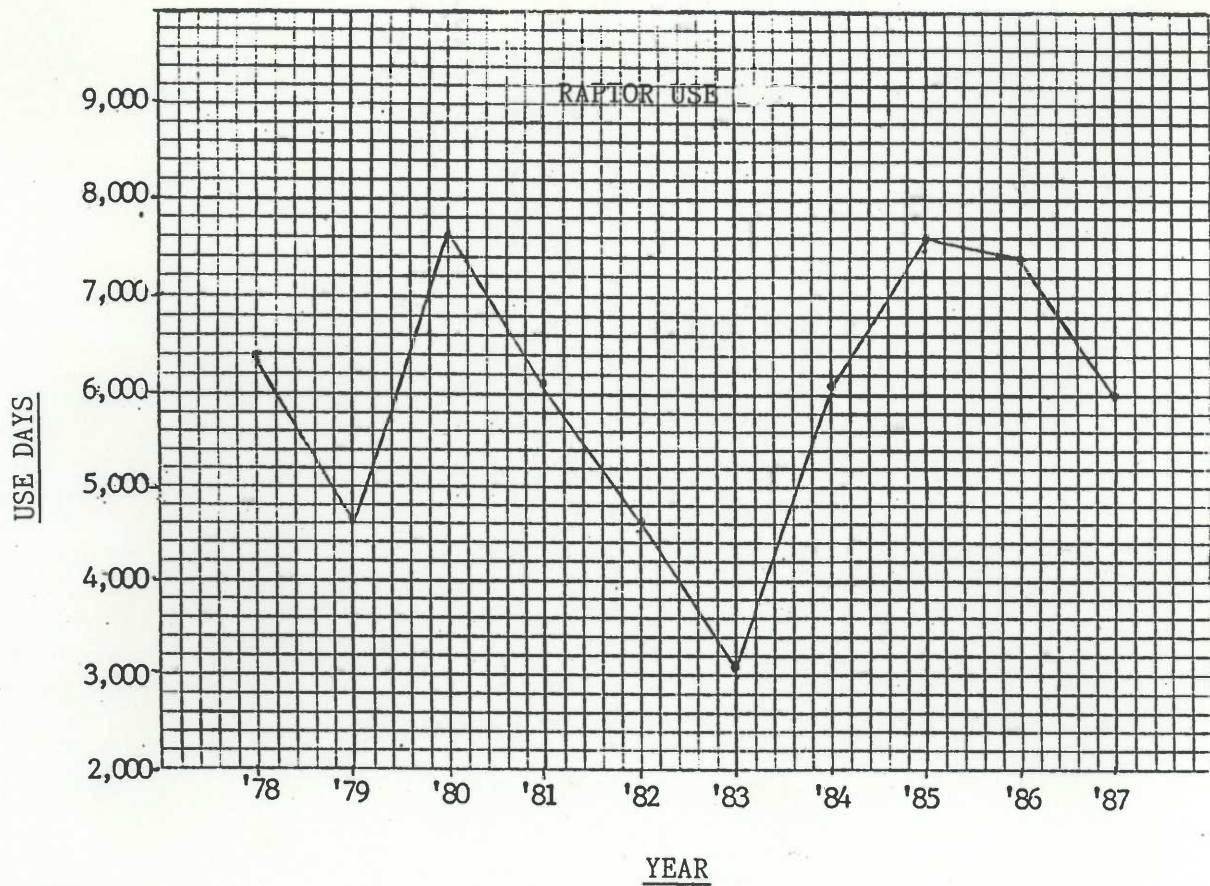
Habitat available for species within this group was minimal during 1987 and bird numbers and use reflected this. Use days were down considerably from 1986 (116,960 UD) with an estimated 46,690 use days being recorded for 1987.

The sighting of a Sabine's gull in September put the refuge on the local birders hot line, bringing additional visitors to the area.

6. Raptors

Fall visitation often increases as traditional raptor migrations reach the refuge. Several migrations were observed this year but with fewer birds involved. Those species known to use the refuge are listed below with species observed during 1987 marked with an asterisk.

-*Bald eagle	-*Northern harrier
-*Golden eagle	-American kestrel
-Peregrine falcon	-Merlin
-*Osprey	-Goshawk
-*Cooper's hawk	-Mississippi Kite
-*Red-shouldered hawk	-Great horned owl
-*Sharp-shinned hawk	-*Barred owl
-*Broad-winged hawk	-Screech owl
-*Rough-legged hawk	-Long-eared owl
-*Red-tailed hawk	-Short-eared owl



8. Game Mammals

White-tailed deer, cottontail rabbit, fox and grey squirrels, coyote, red fox, mink, opossum, beaver and muskrat are known to use the refuge and most are common on the division.



10. Other Resident Wildlife

Native grasses around refuge facilities are providing good shelter for bob-white quail and ring-necked pheasant. Resident populations appear to be fairing well. An increasing number of turkey observations have also been reported this year.

11. Fisheries Resources

The Fisheries Biologist for RF-2 continued sampling of Swan Lake fish populations in 1987. Although sampling was planned on a quarterly schedule, unusually shallow lake levels during the summer months prevented sampling at that time. A report on the results has not yet been received.

A permit was issued to Bob Sheehan and Leo Bodensteiner of Southern Illinois University at Carbondale, to carry out investigations involving water quality analyses and fish populations sampling on Swan Lake.

H. PUBLIC USE

1. General

The replacement VCR finally arrived and was set up for visitor use. At present 5 programs are available for public viewing:

- 1) "Our Nations Wetlands" - U.S.F.W.S. - 28 minutes
- 2) "Duck Stamp Program" - U.S.F.W.S. - 16 minutes
- 3) "Duck Stamp Program" - U.S.F.W.S. - 2.5 minutes
- 4) "Wild Refuge" - Marty Stouffer - 28 minutes
- 5) "Introduction To Brussels District" - U.S.F.W.S. - 4 minutes

An estimated 4,080 visits were made to the Calhoun Division during 1987 by the public.

2. Outdoor Classrooms - Students

Short environmental programs were presented to 2 school groups (25 students, 3 educational staff) during 1987.

3. Outdoor Classrooms - Teachers

Although the Calhoun District does not have a formal environmental education program, Calhoun staff assist teachers in the development of environmental education programs for their class curriculum. Resources for environmental education instruction available for instructors use include: "Project Wild" (Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Education Council), "National Institute for Urban Wildlife Issue Packs (U.S.F.W.S.), "We Can Help" (U.S.F.W.S.), "The Class Project" (National Wildlife

Federation), "Investigating Your Environment" (U.S.F.S.) and "Outdoor Biology Instructional Strategies" (Lawrence Hall Of Science, University Of California, Berkeley).

6. Interpretive Exhibits/Demonstrations

An estimated 1,067 visitors spent approximately 460 hours at the Calhoun Visitor Center during 1987. In addition to the showing of the film "In Celebration Of America's Wildlife" in July, a presentation on local flooding and it's affects on refuge management was given to members' of The Nature Institute in May.

To increase public awareness and encourage participation in the "Take Pride In America Program", the refuge hosted a bluebird workshop put on by Illinois Department Of Conservation Biologist Bob Lindsey. Bluebird boxes were given to each participant to be used as a model for the construction of additional boxes.

September 27th refuge staff represented the U.S.F.W.S at the annual National Hunting and Fishing Day event held at Nilo Farms in Brighton, Illinois. Although the weather was fair, attendance was estimated at no more than a few hundred people. Considerably fewer agencies and companies were present and it was mentioned that this may be the last year for the event.

9. Fishing



Proud of their catch. DK

Both sport and commercial fishing are popular activities on the Calhoun Division. An estimated 1,435 visits and 3,490 hours were recorded for sport fishing alone. These figures are down from last years 2,370 visits and 8,640 hours, however fishing conditions were not optimal with low river stages most of the year. Fifty permits were issued for commercial fishing with the total catch for 1987 and previous years for comparison listed below.

	<u>1987</u>	<u>1986</u>	<u>1985</u>	<u>1984</u>	<u>1983</u>	<u>1982</u>
Carp	39,830	91,326	50,270	55,547	61,262	74,406
Buffalo	44,595	205,808	39,689	58,740	58,863	58,485
Catfish	3,602	8,128	7,773	6,757	6,638	5,431
Perch (Drum)	1,911	6,774	3,847	6,898	6,910	7,857
Spoonbill	459	1,495	2,117	4,938	5,165	7,159
Bowfin	<u>200</u>	<u>0</u>	<u>111</u>	<u>118</u>	<u>757</u>	<u>195</u>
Total pounds	90,597	313,531	103,807	131,001	139,595	153,533

10. Trapping

This section is covered in planning, section D.2.

11. Wildlife Observation

Wildlife observation is the primary public use activity on the Calhoun Division. An estimated 1,495 visits totaling 1,135 hours, were made to observe wildlife at Calhoun during 1987. In addition to the above figures, visits to the Refuge Visitor Center (1,067 visits, 484 hours) are usually associated with wildlife and wildlife observation.

12. Other Wildlife Oriented Recreation

Although few pecan trees remain on the refuge, visits by the public to gather nuts and hunt mushrooms continue. Wildlife photography is also enjoyed by the public.

17. Law Enforcement

Refuge Manager Peyton and Assistant Manager Kimbrell attended L.E. refresher training March 30th - April 3rd and requalified September 23rd, both in Springfield, Illinois. Refuge patrol was coordinated with other refuge activities and no citations were issued.

I. EQUIPMENT AND FACILITIES

1. New Construction

A new machinery storage pole shed building was constructed this year. The contract for this building was awarded to Poettker Construction Company, Breese, Illinois on July 13. Although this building was manufactured by Frontier the specifications were written so that the buildings manufactured by any of the other post frame building companies would have been acceptable. Total cost of the 45'W x 72'L storage building was \$23,423 for labor and construction materials. An amendment of \$13,764 was made to the original contract to pour a 4 inch thick concrete slab in the building. The refuge maintenance mechanic accomplished all dirt work and exterior landscaping. He also hauled and spread rock constructing the entrance drives into the building.



Begin with prefab sections

DK



Add a few more
DK



The finished product

DK

3. Major Maintenance

Road rock was purchased and tailgate spread on Gilbert Lake access road.

4. Equipment Utilization And Replacement

The refuge video player was replaced with a new unit by the manufacturer. The old unit had been sent back for repairs several times and the manufacturer finally decided they couldn't fix it.

The Case dozer was transported to Delair Division where it was used to spread spoil which resulted from a ditch cleanout.

6. Computer Systems

Purchase orders were issued for the necessary components to set up an IBM computer system.

7. Energy Conservation

An effort to reduce energy consumption was made by turning back thermostats when the refuge buildings were not in use. The heating and cooling systems were checked to make sure they were operating properly.

Energy required for pumping to flood areas was reduced by gravity flooding whenever possible.

8. Other

Metal wood duck boxes donated by the Migratory Waterfowl Hunters were installed.

The boundary line was checked and damaged and missing signs were replaced.

A bluebird box trail was established along a row of trees near the refuge shop.

Eight new fire extinguishers were purchased and installed in the refuge buildings.

The lock and spring on an overhead shop door was replaced.

Refuge dikes were mowed and repaired where required.

J. OTHER ITEMS

3. Items Of Interest

A refuge revenue sharing check for \$3,829 was presented to Calhoun County.

4. Credits

This narrative report was written by Assistant Refuge Manager Kimbrell except for sections D, E5 and 7, F3 and 4, I and J, which were written by Refuge Manager Peyton. Refuge Secretary Kuhn typed and organized the report.



Geese in cornfield near Yorkinut Lake. DK

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B. CLIMATIC CONDITIONS

Climatic conditions were relatively the same as for the Calhoun Division (see Section B for Calhoun).

F. HABITAT MANAGEMENT

1. General

Batchtown Division is located in central Calhoun County, Illinois and is bordered on the west by the Mississippi river. Approximately 2,428 acres are contained within the Batchtown boundary, 42 of which are managed as a moist soil unit and 228 acres farmed by co-operative farmers. Prairie Pond, also called Middle Pool is partially diked off from the river, contains a water surface of approximately 547 acres and is managed to a small degree for natural plant production.

Essentially no water control exists for the Upper and Lower pools. The influence of management by the Corps of Engineers on navigation pool #25 is the sole exception. If the Corps of Engineers hold pool #25 at approximately 431.23 msl or lower during June and July, germination of natural vegetation can take place. However, Corps of Engineers Management is dependent on commercial shipping and flood conditions, hence no actual control exists.

A reversible pumping station with the capacity to deliver 20,000 gallons per minute can draw water from the river and deliver it into the Prairie Pond extension (see illustration A) and vice versa. At present, nine water control structures exist on the Batchtown Division.

Water is supplied to the moist soil unit using a crisafulli pump, drawing water from an extension of Prairie Pond on the moist soil unit's southern border.

Approximately 45 acres of willow, cottonwood and maple trees were aerially sprayed with rodeo herbicide on October 1st (See F.10). Results are unknown at this time.

2. Wetlands

For the first time in years no flooding of the Batchtown Division (due to river overflows) occurred during 1987. Mississippi River levels remained below flood stage the entire year.

September 28th a stop log water control structure near Watson Pond was replaced with a screwgate structure. Pumping into Prairie Pond (ie Middle Pool) began November 3rd and ended November 6th. Approximately 83,700,00 gallons of water (11,160,000 cu. ft.) was pumped in 77.5 hours.

a) Moist Soil Unit

In the spring of 1987, all but a narrow strip running east - west and two low spots on the east end developed in tall ironweed. The narrow strip and two low spots produced fair stands of millet and Polygonum species other than P. coccineum. July 10th the tall ironweed was mowed and 10 acres of this area disked July 20-24. The disked area was then seeded with Japanese millet, grain sorghum and buckwheat July 25. A check August 20th showed poor results, possibly due to the use of year old seed. September 28th the stop log water control structure on the east end of the unit was replaced with a screwgate structure. Approximately 51,840,000 gallons (6,912,000 cu. ft.) of water was pumped into the moist soil unit October 7th-9th over a period of 48 hours. Pumping was repeated October 14th-16th; 31,320,000 gallons (3,960,000 cu. ft.), 27.50 hours.

Blue and green-winged teal, mallards and Canada geese were the primary species observed using the moist soil unit during the spring and fall. Use was concentrated in the center strip and two low areas on the east side.

3. Forests

One hundred and thirty six pin oak seedlings which were received from the Illinois Department Of Conservation were planted on Batchtown.

A check of the survival 126 pin oaks and 50 green ash trees 6-10 feet tall was made in March. This survey revealed a survival rate of 71% for the pin oaks and 68% survival rate for the green ash.

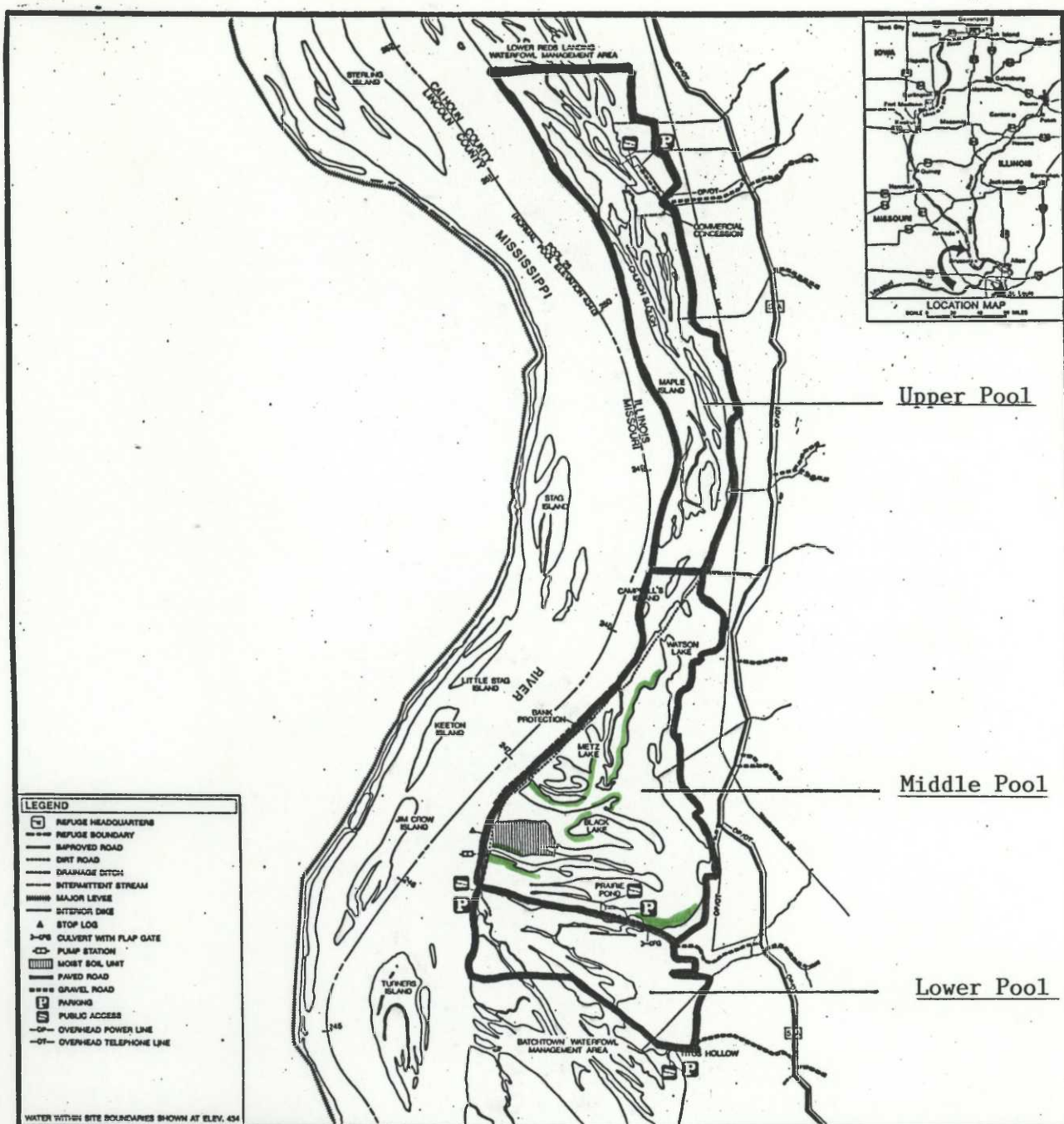
4. Croplands

Nine cooperative farmers cultivated 194 acres; 98.5 acres of corn, 67.5 acres of soybeans, 22 acres of wheat and 6 acres of millet. Waterfowl foods left in the field amounted to 1,680 bushels of standing corn, 536 bushels of waste corn following the harvest, 51 bushels of waste soybeans following harvest, 180 bushels of millet and 24,750 pounds of wheat browse.

In addition to the food provided for waterfowl 5.5 bushels of corn and 250.75 bushels of soybeans were harvested and taken to the elevator to be sold. This added 1,825.06 to the 5092 special account.

10. Pest Control

Vegetation encroachment on Prairie Pond and connecting lakes has increased significantly over the past several years. In 1985 a program to reduce this encroachment was initiated. Due to access difficulties, size and expanse of vegetation, and limited personnel, herbicide spraying was chosen as the appropriate method of reduction. Spraying commenced in August of 1985, was expanded in 1986 and 1987.



EXISTING DEVELOPMENT/ROAD & UTILITY

BATCHTOWN DIVISION

MARK TWAIN NATIONAL WILDLIFE REFUGE

U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR



Illustration A

Approximately 45 acres of willows, cottonwood and maple trees on the Batchtown Division were aerially sprayed with rodeo herbicide (2.5 qts./Acre) October 1st, 1987. An accurate evaluation of spray results could not be achieved as fall foliage loss occurred shortly after spraying. The areas will be checked in the spring.

The following is a summary of chemicals used on the Batchtown Division by co-operative farmers during 1987.

<u>Chemical</u>	<u>Target Pest</u>	<u>Acres Treated</u>	<u>Crop</u>	<u>Rate</u>
Atrazine	#2, 4	42	Corn	1 lb./Acre
Lasso	#2	42	Corn	1 lb./Acre
Lasso	#2	1.5	Soybeans	.8 lb./Acre
Lorox DF	#2	1.5	Soybeans	.33 lb./Acre
Treflan	#1, 2	18	Soybeans	1.5 lb./Acre

*#1: Johnson grass

#2: Cocklebur, morning glory, smartweed and other broadleaf weeds

#4: Foxtail and other grasses

G. WILDLIFE

2. Endangered And/Or Threatened Species

Forty three bald eagles (27 adult, 16 immature) were observed on the Batchtown Division during the January 1987 bald eagle census. Later in December, 9 bald eagles (5 adult, 4 immature) were observed on the division. Traditional January eagle censuses typically show a greater number of eagle observations than the Christmas censuses do (for the refuge). Local conditions are often not optimal for bald eagle and waterfowl during December.

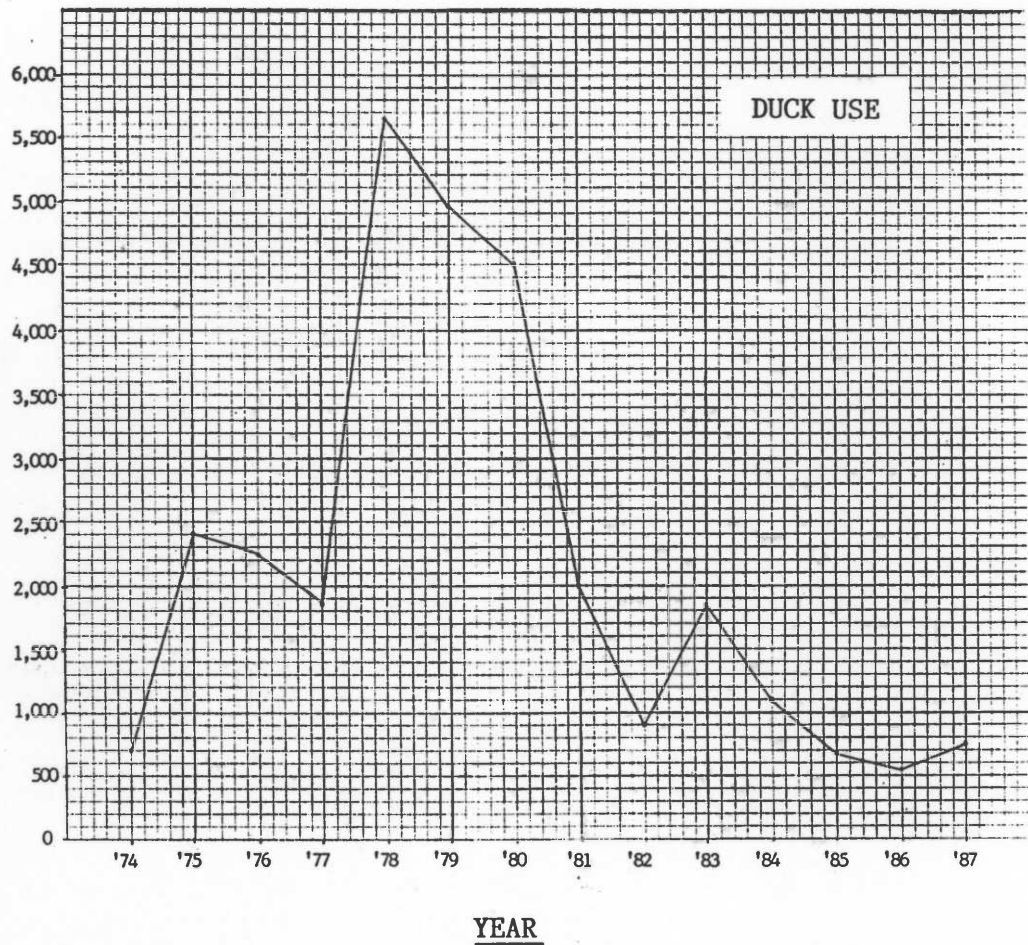
Use days for 1987 on the Batchtown Division were estimated at 2,000. This estimate is slightly lower than that for 1986; 2,500 and 1985; 2,125, but still greater than estimates for the 8 years prior to 1985.

3. Waterfowl

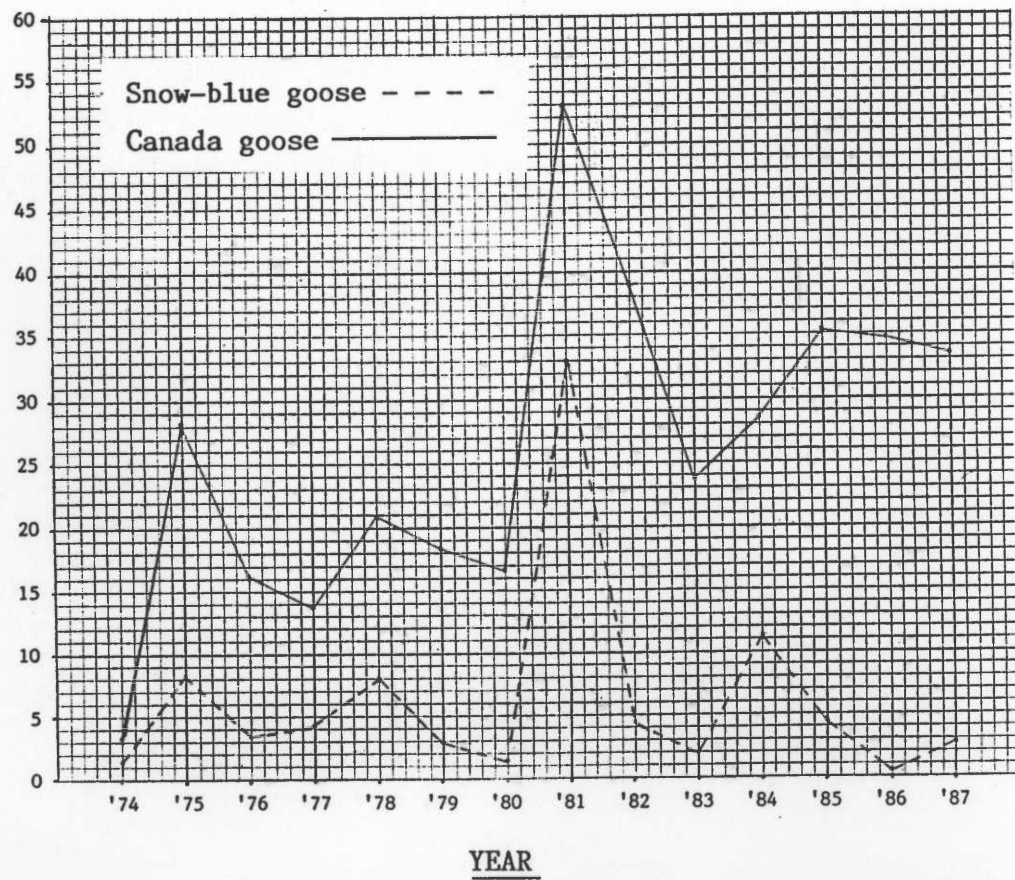
Waterfowl tend to concentrate on some of the more remote sections of Prairie Pond and the Batchtown moist soil unit. Peak populations of 10,870 ducks, 100 snow-blue geese and 250 Canada geese were recorded for 1987. This is an increase for all three groups over peak populations in 1986 (ducks; 5,660, snow-blue geese; 25, Canada geese; 1,000). Use days for ducks and snow-blue geese showed an increase from 1986 to 1987: ducks 1987; 2,688,000, 1986; 500,000, snow-blue geese 1987; 748,400, 1986; 550,000. Canada goose use estimates; 33,483 UD, decreased slightly from 1986; 34,750 UD.

Five of the 10 wood duck nest boxes donated by Migratory Waterfowl Hunters Inc., were installed along a major slough north of the Batchtown moist soil unit.

USE DAYS IN THOUSANDS



USE DAYS IN THOUSANDS



4. Marsh & Water Birds

Several species of water birds can be observed on the division at various times throughout the year, but the most common species include: great blue heron, green-backed heron, yellow-crowned heron, common egret, double-crested cormorant and pied-billed grebe. Estimated use days for this group of birds is 82,912.

5. Shorebirds, Gulls, Terns And Allied Species

Little in the way of habitat was available for shorebirds on the Batchtown Division this year. Use by gulls remained about the same but a reduction in the number and species of terns was observed. Estimated use days for birds of this group is 24,695.

6. Raptors

Several species of raptors migrate through the area each fall and winter. Some of the more common species are: red-tailed hawk, bald eagle, northern harrier, kestrel, Cooper's hawk, screech and barred owls. For a complete list refer to the Calhoun Division, section G. Estimated use days for raptors is 3,730.

8. Game Mammals

Diversity of game mammals on the Batchtown Division is very similar to that of the Calhoun Division.

H. PUBLIC USE

9. Fishing

Sport fishing is a popular activity on the division. The area is open year round except for the period October 15th through December 15th with catfish, bluegill and crappie being the more common catch. An estimated 1,685 visits totaling 5,680 hours, were spent fishing on the Batchtown Division in 1987.

10. Trapping

See Calhoun Division, section D.2.

11. Wildlife Observation

Batchtown offers good opportunities for wildlife observation. The best opportunities are available to those with a canoe or boat or the ability to walk long distances. An estimated 860 visits involving 457 hours, were made to the division to observe wildlife in 1987.

17. Law Enforcement

See Calhoun, section H.17.

I. EQUIPMENT AND FACILITIES

8. Other

Two water control structures on Prairie Pond which were washed out by last years floods were replaced with screwgate structures and rip rap placed around them.

Five wood duck boxes donated by the Migratory Waterfowl Hunters were put up.

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1. General	NTR
2. Outdoor Classrooms - Students	NTR
3. Outdoor Classrooms - Teachers	NTR
4. Interpretive Foot Trails	NTR
5. Interpretive Tour Routes	NTR
6. Interpretive Exhibits/Demonstrations	NTR
7. Other Interpretive Programs	NTR
8. Hunting	NTR
9. Fishing	5
10. Trapping	NTR
11. Wildlife Observation	5
12. Other Wildlife Oriented Recreation	NTR
13. Camping	NTR
14. Picnicking	NTR
15. Off-Road Vehicling	NTR
16. Other Non-Wildlife Oriented Recreation	NTR
17. Law Enforcement	5
18. Cooperating Associations	NTR
19. Concessions	NTR

I. EQUIPMENT AND FACILITIES

1. New Construction	NTR
2. Rehabilitation	5
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	NTR
5. Communications Systems	NTR
6. Computer Systems	NTR
7. Energy Conservation	NTR
8. Other	7

J. OTHER ITEMS

Page

1. Cooperative Programs	NTR
2. Other Economic Uses	NTR
3. Items of Interest	NTR
4. Credits	NTR

A. HIGHLIGHTS

No major floods on the division throughout the year.

An increasing number of turkey observed.

B. CLIMATIC CONDITIONS

Since Gilbert Lake is within the same general locality as the Calhoun Division, climatic conditions are essentially the same as with the Calhoun Division.

F. HABITAT MANAGEMENT

1. General

The Gilbert Lake Division is located along State Route 100 in Jersey County, Illinois, west of the Brussels Ferry. The division consists of approximately 656 acres and is bordered along the southern edge by the Illinois River. Of the 656 acres, approximately 250 surface acres makeup Gilbert Lake proper, 98 acres are in a co-operative farming program, 39.5 acres are in hay and the remaining lands consist of marsh and timber.

Seasonal flooding typically inundates the division during both the spring and fall however no major flooding of the division occurred this year.

Aerial applications of rodeo herbicide were made May 5th along lake edges in an attempt to reduce willow encroachment (see sec. F.10).

2. Wetlands

Water was held on Gilbert Lake with no pumping in or out of the lake during 1987. Some water was lost out of the lake during the summer when a stop log structure on the east end was found full of debris and leaking water. The structure was cleared and additional stop logs put in place to prevent further loss.

4. Croplands

Sixty six acres on Gilbert Lake were cultivated by one cooperative farmer. This acreage included 39 acres of soybeans, 12 acres of corn and 15 acres of wheat. This cropland provides waterfowl food in the following amounts; 32.5 bushels of waste soybeans following harvest, 98 bushels of waste corn following harvest, 700 bushels of standing corn and 16,875 pounds of wheat browse.

This farmer's cooperative agreement also includes an 11 acre alfalfa - grass mixture field and a 28.5 acre alfalfa - ladino clover field. The farmer is allowed to cut hay off of these areas up until September 30. This keeps the alfalfa short so waterfowl can utilize it after they start arriving. The 28.5 acre alfalfa ladino mixture is on an archeological site located on Illinois Department of Conservation land which requires special cultivation techniques. When this alfalfa dies out it can only be worked to a depth of 6 inches with a field cultivator or a disk.

One 12 acre field that had become grown up with Johnson grass was sprayed

with Roundup in early summer. This killed off most of the Johnson grass but as it started coming back in small areas it was spot sprayed with a hand sprayer. In early September it was disked up and sowed to wheat by the refuge staff.

10. Pest Control

May 5th WLS Flying Service applied rodeo herbicide to fourteen acres of willow, silver maple and cottonwood trees growing along lake edges. The rate of application; 2.75 qts./ac., was increased from last year; 2.50 qts./ac., due to the greater concentration of maple trees in the target area which are not affected by the lower concentrations. Results of the spraying were spotty with a range of good to fair kill.

Chemicals used by cooperative farmers on the division are as follows:

<u>Chemical</u>	<u>Target Pest</u>	<u>Acres Treated</u>	<u>Crop</u>	<u>Rate</u>
Lasso	#2	39	Soybeans	1 lb./Ac.
Lorax	#2	39	Soybeans	1 lb./Ac.
Butyrac	#2	25	Soybeans	.125 lb./Ac.

*#2 Broadleaf weeds

G. WILDLIFE

1. Wildlife Diversity

Wildlife on the Gilbert Lake Division is very similar to that on Calhoun. Deer, raccoon, beaver, muskrat, squirrel and other mammals are commonly found on the division. A wide variety of raptors and water birds can easily be found at various times of the year. Annual osprey and peregrine falcon sightings on the district occur most often on the Gilbert Lake Division.

An increasing number of turkeys have been observed on the division over the past few years. During the 1987 Christmas bird count, 17 turkeys were observed. Earlier in the year groups of 11 turkeys were observed.

2. Endangered And Threatened Species

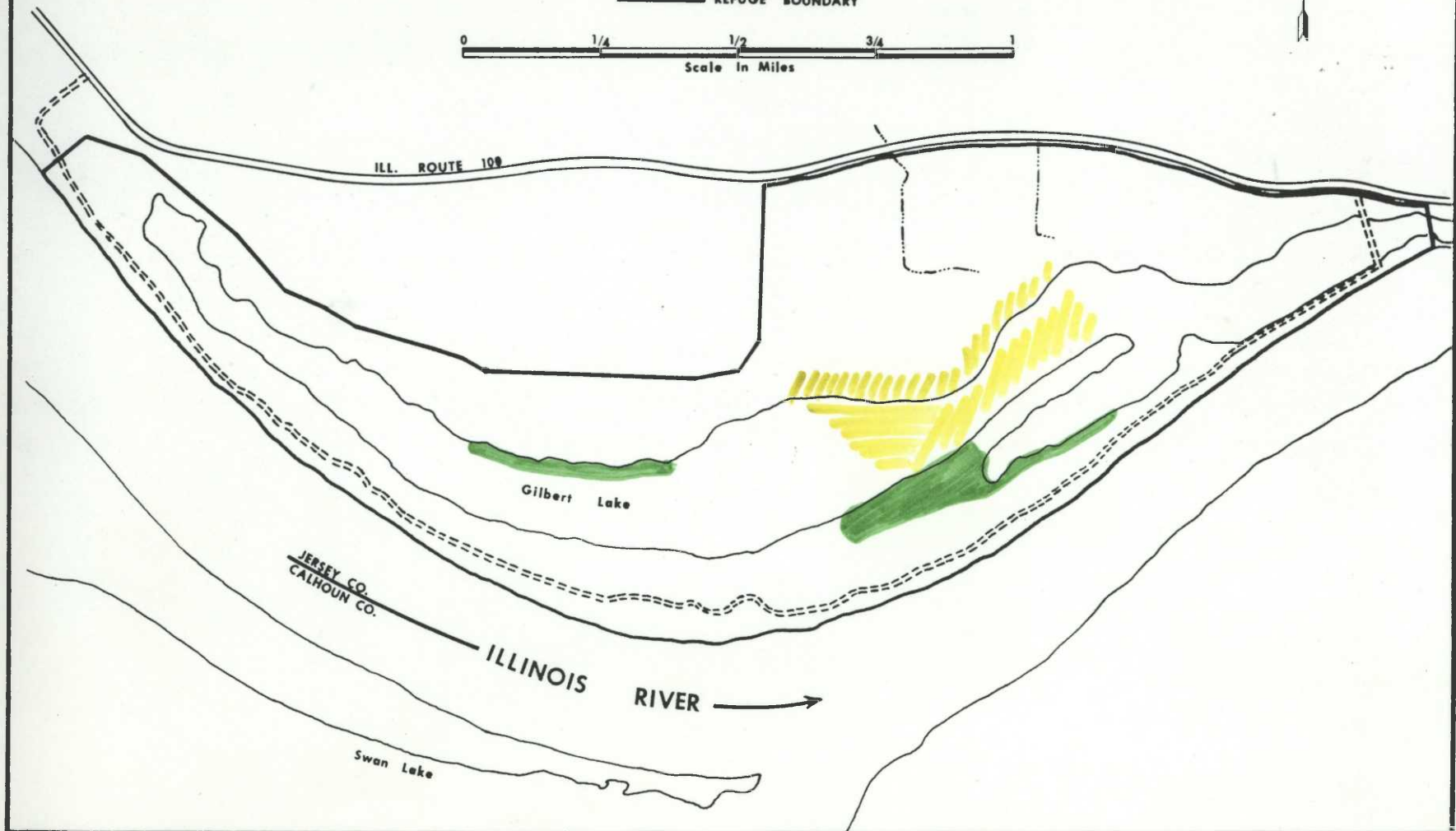
Both the bald eagle and peregrine falcon have been observed on the division. Several wildlife species on the state endangered and threatened list are also found on the Gilbert Lake Division. A list of many of these is found in section G.2 of the Calhoun Division.

MARK TWAIN NATIONAL WILDLIFE REFUGE

GILBERT LAKE DIVISION

JERSEY COUNTY ILLINOIS

REFUGE BOUNDARY



 Herbicide Spray Areas 1987

 Known Primary Waterfowl Use Areas 1987

3. Waterfowl

Peak duck concentrations on the division occurred in November this year with an estimated 2,880 birds. This estimate is essentially equal to last years high of 2,625 birds. Estimated use days for ducks is 258,598.

A peak concentration of 1,500 blue-snow geese was recorded for January and 2,231 Canada geese in December. Estimates are down from that of 1986; 3,000 blue-snow geese in January and 2,500 Canada geese in February. Use days for geese were estimated at 65,153 for blue-snow geese and 105,033 for Canada geese.

4. Marsh And Water Birds

Gilbert Lake attracts a large number of great blue herons, green-backed herons, black and yellow-crowned herons, common egrets, bitterns, cormorants and many other water bird species. Use days for birds of this group are estimated to be 27,000.

6. Raptors

See sections G.2 and 6 of the Calhoun Division and G.2 of the Gilbert Lake Division.

H. PUBLIC USE

9. Fishing

Sport fishing for catfish, bluegill and crappie is a popular activity on Gilbert Lake. The area is open year round except for the period of Oct. 15th - Dec. 15th. Approximately 945 visits totaling 3,310 hours were made to fish on the division during 1987.

11. Wildlife Observation

When environmental conditions permit, Gilbert Lake provides excellent opportunities for wildlife observation. Visitors can observe wildlife from an overlook off Illinois State Highway 100 or walk the 3 mile maintenance road which runs along the division's southern edge. For those who have a canoe, the lake has even more to offer. Forty seven species were observed on the division this year during the Christmas bird count.

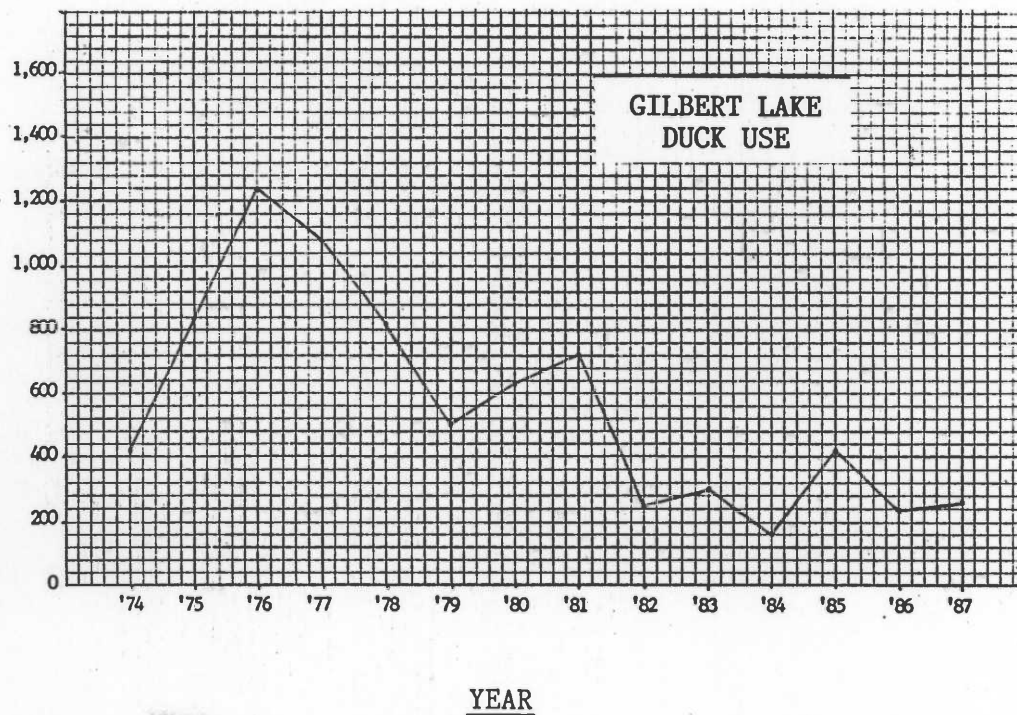
17. Law Enforcement

See Calhoun Division, section H.17.

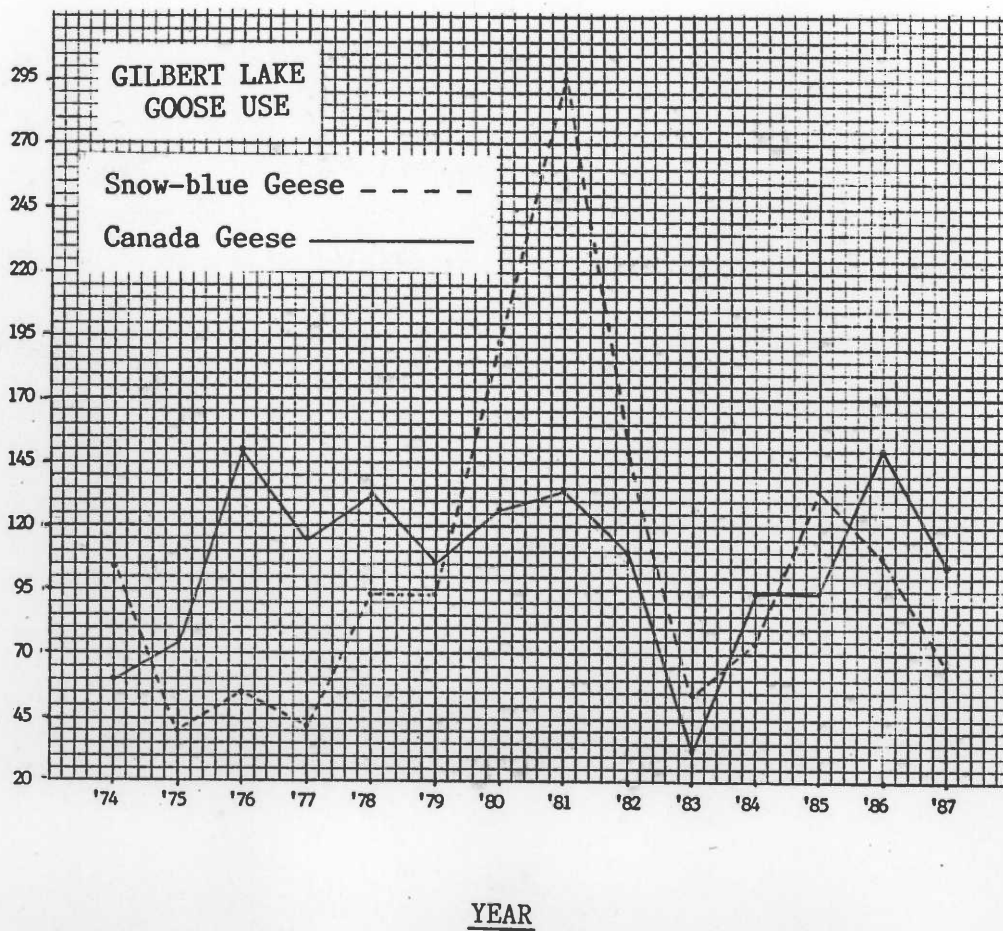
I. EQUIPMENT AND FACILITIES

2. Rehabilitation

USE DAYS IN THOUSANDS



USE DAYS IN THOUSANDS



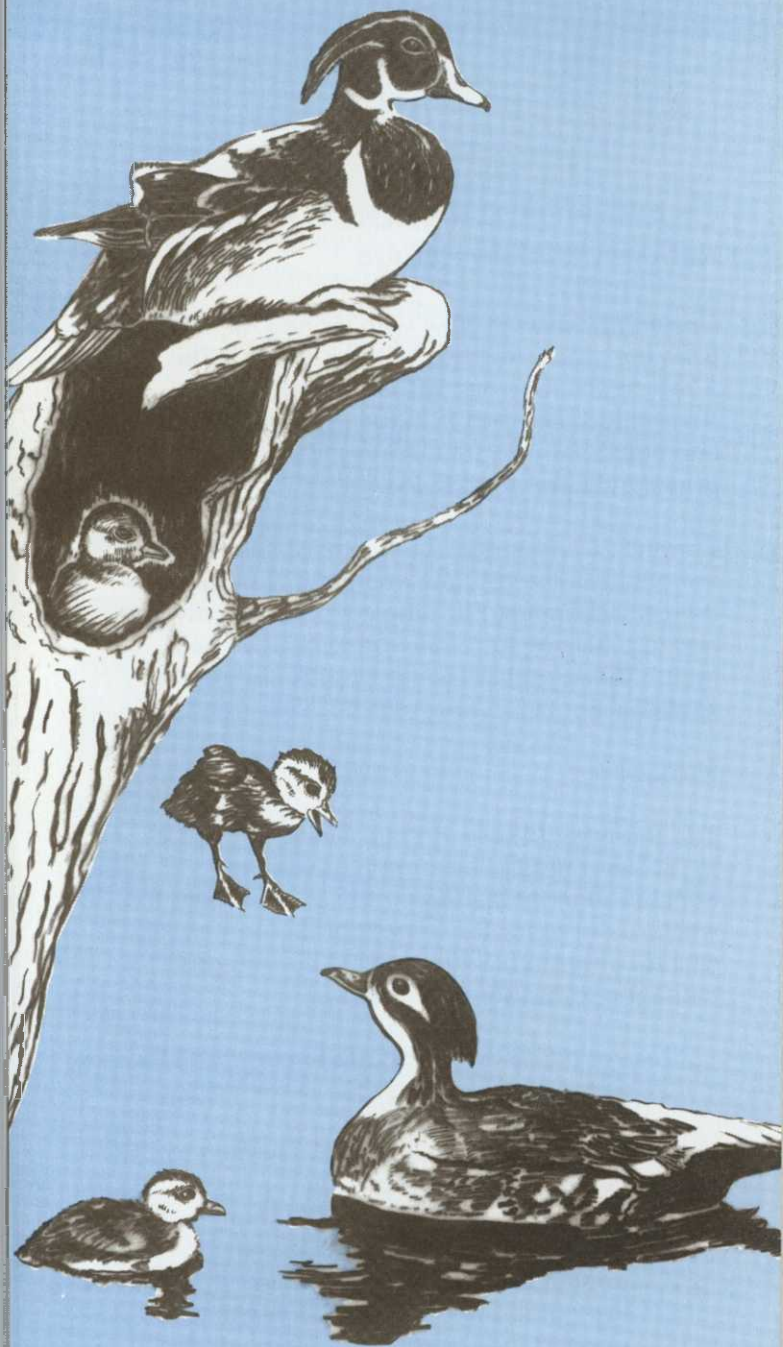
The local rock quarry hauled and tailgate spread 700 tons of road rock on Gilbert Lake access road.

8. Other

Wood duck nest boxes were put up on Gilbert Lake.

CLARENCE CANNON

National Wildlife Refuge



Missouri



CLARENCE CANNON National Wildlife Refuge

was established in 1964 with money raised from the sale of federal "duck stamps". The 3,747 acre refuge lies within the Mississippi River floodplain and is made up of permanent and seasonally flooded impoundments, forests, grasslands and crop fields.

Clarence Cannon Refuge is one of nearly 430 national wildlife refuges scattered throughout the United States. Forming a network of diverse habitats across America, these refuges help insure the continued survival of America's wildlife.

Purpose

The National Wildlife Refuge System's goal is to further a national program of wildlife conservation by managing the environment for wild creatures for the benefit of the public. Clarence Cannon National Wildlife Refuge is managed to further that goal by:

- Providing migrating waterfowl with food, water and a resting area in the spring and fall.
- Maintaining and improving habitat for nesting wood ducks.
- Providing for the needs of other migratory birds and a balanced population of resident wildlife.
- Providing the public with a place to understand the relationships between man, plants and wildlife.

Managing for Wildlife

A variety of management techniques are used to enhance habitat diversity on Clarence Cannon Refuge. Activities such as mowing, discing, limited farming, burning and fallowing are used either by themselves or in a variety of combinations to create the desired vegetative response within a given area. The most important element for wildlife management at Clarence Cannon, however, is water level manipulation.

Water is drained from impoundments in early summer to allow the natural regrowth of plants such as foxtail, millet, smartweed, and nutgrass. These impoundments (or moist soil units) are then flooded in the fall after the plants have produced seed. Migrating waterfowl find this combination of water and natural seed source an irresistible invitation to feed and rest before continuing on their tiring journey.

Green tree reservoirs (bottomland forests with large cavity-ridden trees) are seasonally flooded and drained like the moist soil units. The abundant food supply and available nesting cavities make attractive feeding and spring nesting areas for wood ducks and other wildlife.

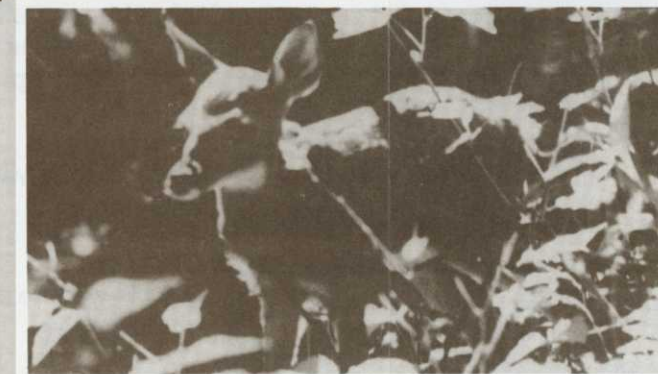
A limited amount of farming is also used to provide waterfowl with a supplemental, high energy food source such as corn and wheat.

Wildlife

Serving as a link in a chain of migratory bird refuges reaching from northern breeding grounds to southern wintering areas, Clarence Cannon Refuge is centrally located along one of the Nation's most important migration routes, the Mississippi Flyway, affording visitors a unique opportunity to see and enjoy many types of wildlife.

Over 200 species of birds visit the refuge throughout the year. Mallards, pintail, widgeon, teal, shovelers, scaup, gadwall, Canada geese and snow geese are but a few of the waterfowl that visit the refuge by the thousands during the spring and fall migrations.

Wood ducks are commonly seen during all but the coldest months, and in early spring many nest in hollow trees along open water and raise their young in the refuge's river bottom habitat.



Bald Eagles - an endangered species - are often seen during the fall migration as they gather to feed on sick and injured waterfowl.

Hérons, egrets, rails, bitterns and many other shore and wading birds are commonly seen feeding in refuge wetlands through the summer. Deer, squirrel, racoon, muskrat, turkey, beaver, mink, skunk, opossum and coyote are year-round residents at Clarence Cannon National Wildlife Refuge, but are not always easy to spot.

For successful wildlife observation, keep in mind:

- The best time to see wildlife is early morning and early evening.
- October through November and March through April are the best months to see large concentrations of waterfowl. Shorebird and warbler migrations usually peak around the first week of May.

- Binoculars and field guides are especially helpful and will make your refuge visit more enjoyable.
- Wildlife will be startled by sudden movements and loud noises. Quiet, patient observers see the most wildlife.

Location

About an hour's drive north of St. Louis on Missouri Highway 79, the refuge is located one mile east of Annada, Missouri. Motels, service stations and restaurants are available nearby in Clarksville and Elsberry.

Clarence Cannon Refuge is a part of the larger Mark Twain National Wildlife Refuge Complex headquartered in Quincy, Illinois. The Clarence Cannon staff is also responsible for the 1,700 acre Delair Division in

Pike County, Illinois, and the 6,300 acre Gardner Division in Adams County, Illinois.

Refuge Signs-

Know their Meaning



REFUGE BOUNDARY
SIGN - ENTRY
FOR AUTHORIZED
ACTIVITIES ONLY



ALL PUBLIC ENTRY
PROHIBITED IN
POSTED AREA



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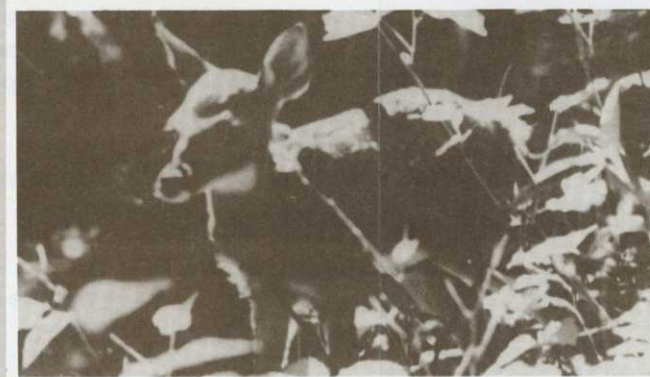
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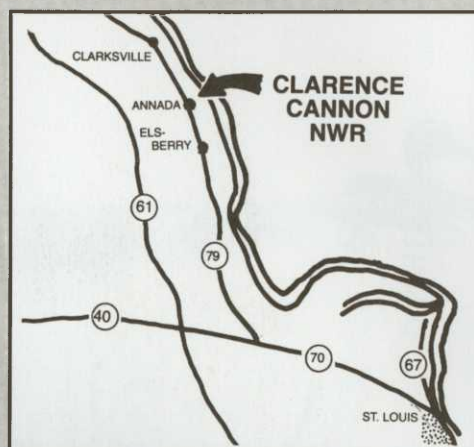
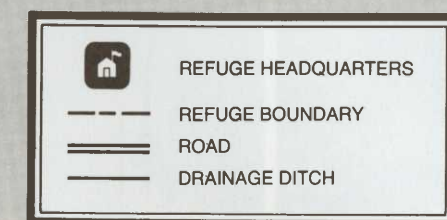
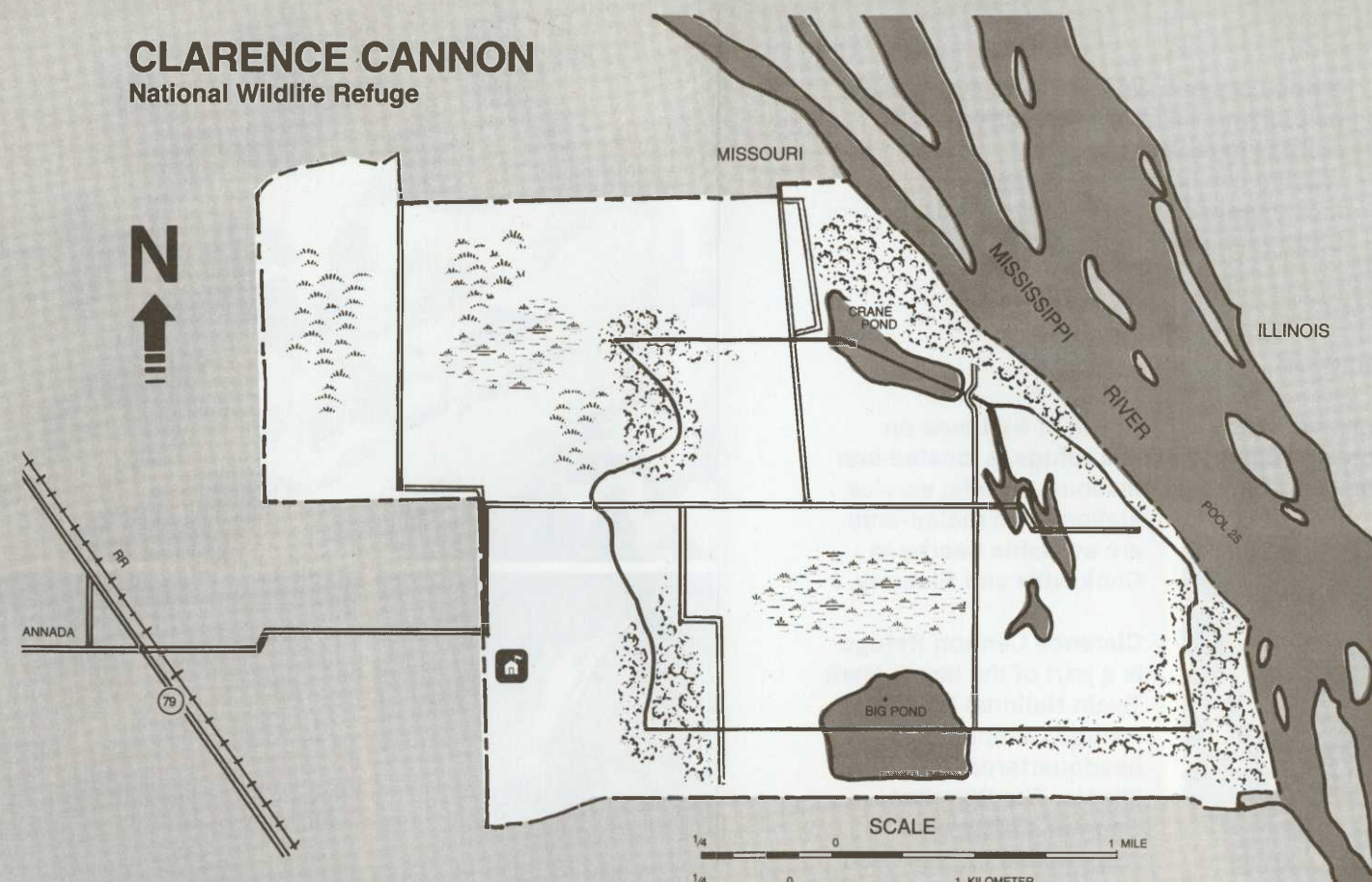


REFUGE BOUNDARY
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ACTIVITIES ONLY



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POSTED AREA

CLARENCE CANNON National Wildlife Refuge



Refuge Regulations

While Clarence Cannon Refuge welcomes you to engage in several recreational activities, certain regulations are necessary to protect wildlife and preserve the beauty of the area. More detailed information and other regulations may be obtained from the Refuge Manager. Any public access or activities that is not specifically permitted is prohibited.



Wildlife observation is permitted and encouraged ...



... as is wildlife and wildland photography.



Berry, nut and mushroom picking is allowed. The refuge staff will be happy to direct you to the choice spots.



Fishing is prohibited on the refuge. However, the refuge staff may be able to point out where the fish are biting nearby.



Firearms and alcoholic beverages are prohibited on the refuge at all times.



While touring the refuge, observe the 25 mph speed limit and remain on gravelled roads at all times.



Special group trips (school groups, scouts, etc.) are encouraged. Guided tours may sometimes be arranged in advance.

Take Pride In Your National Wildlife Refuge

As Americans, we have an obligation to be good stewards of our public lands — as citizens, neighbors and caretakers for future generations.

There are many ways you can share in the upkeep of Clarence Cannon National Wildlife Refuge and play an active role in helping to see that its objectives are met. Planting trees, posting signs, painting, mowing and picking up litter and other debris are among the many citizen activities that can be of help. Perhaps you have some artistic or photographic skill you would like to volunteer. Or perhaps your civic group or club would like to make a financial contribution for a needed tool, wetland development or research study. The refuge staff would be happy to discuss how you can participate in caring for your National Wildlife Refuges.

For further information
call (314) 847-2333 or write:
Refuge Manager
Clarence Cannon National Wildlife Refuge
P.O. Box 88
Annada, MO 63330



RF-3-33640-1-4/87

Mark Twain National Wildlife Refuge

Illinois, Iowa, Missouri



History

The 23,500 acre Mark Twain Refuge, formally established in 1958, lies within three states — Illinois, Iowa, and Missouri. Its area of influence extends for nearly 250 miles along the Mississippi River Valley and a short distance up the Illinois River from its confluence with the Mississippi. The areas managed by the refuge are as varied as the rivers themselves.

Clarence Cannon National Wildlife Refuge and the Delair Division were purchased with duck stamp monies in 1964. Most of the remaining acreage was transferred for wildlife management from the U.S. Army Corps of Engineers to the U.S. Fish and Wildlife Service. The Corps originally purchased these lands as part of the river navigation project.

Only four of the divisions are protected by levee systems that provide some relief from annual river flooding. However, natural flooding remains as the greatest constraint to management and protection of refuge areas.

Wildlife

The nine divisions in the Mark Twain Refuge are links in a chain of migratory bird refuges reaching from the northern breeding grounds to the southern wintering areas. They are located in one of the Nation's most important migration routes, the Mississippi Flyway. The divisions provide the migratory birds with food, water, and resting areas during their migration down the Mississippi River valley.

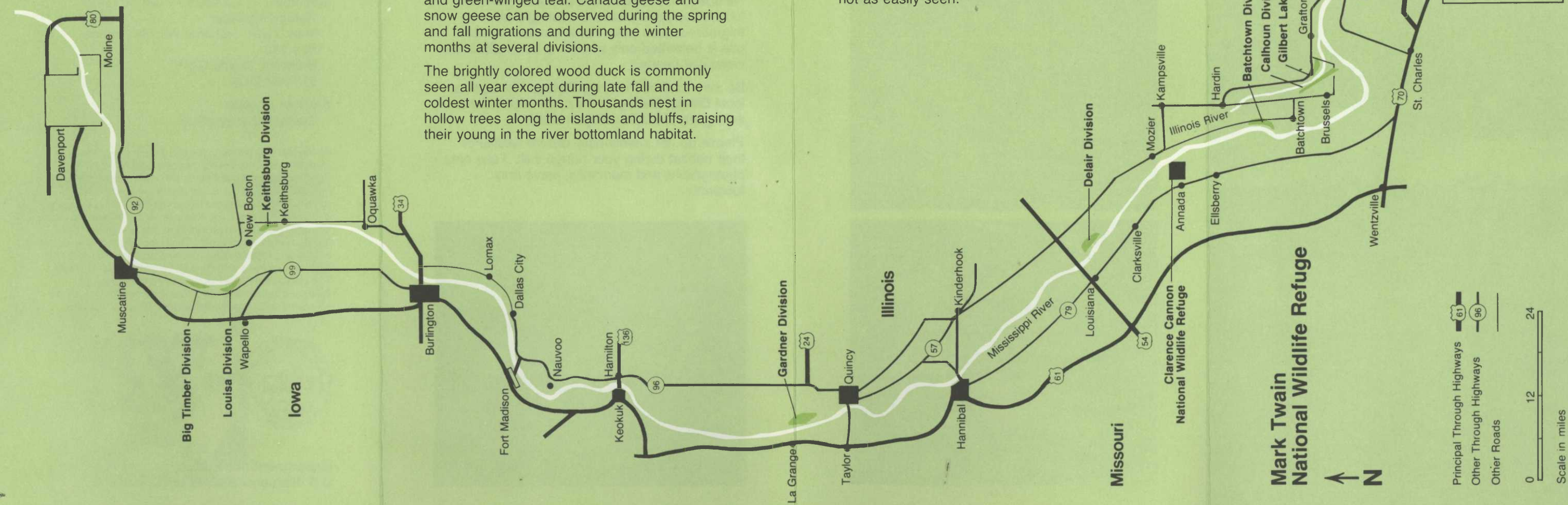
Waterfowl have the most spectacular seasonal flights with more than 100,000 mallards common at some divisions. Other ducks commonly seen on the refuges are wood duck, pintail, wigeon, black duck, blue-winged teal, scaup, shoveler, gadwall, canvasback, redhead, and green-winged teal. Canada geese and snow geese can be observed during the spring and fall migrations and during the winter months at several divisions.

The brightly colored wood duck is commonly seen all year except during late fall and the coldest winter months. Thousands nest in hollow trees along the islands and bluffs, raising their young in the river bottomland habitat.

One of the largest wintering concentrations of bald eagles in the contiguous 48 states is found along the Mississippi River near the Mark Twain Refuge. Over 500 of these majestic birds have been counted on and near the refuge as they concentrate to feed on fish and waterfowl in open water areas. Eagles usually arrive in October and stay until the ice disappears in the spring.

More than 220 other species of birds use the refuge. Great blue herons, green herons and great egrets are common summer residents. Other marsh, water, and shorebirds are commonly found during the spring and fall months. Migrations of these birds at the Calhoun Division are spectacular during August and September when thousands concentrate on mudflats and lake shoreline.

White-tailed deer, squirrels, raccoons, skunks, opossums and fox are frequently observed. Muskrats, beaver, and mink are common but not as easily seen.



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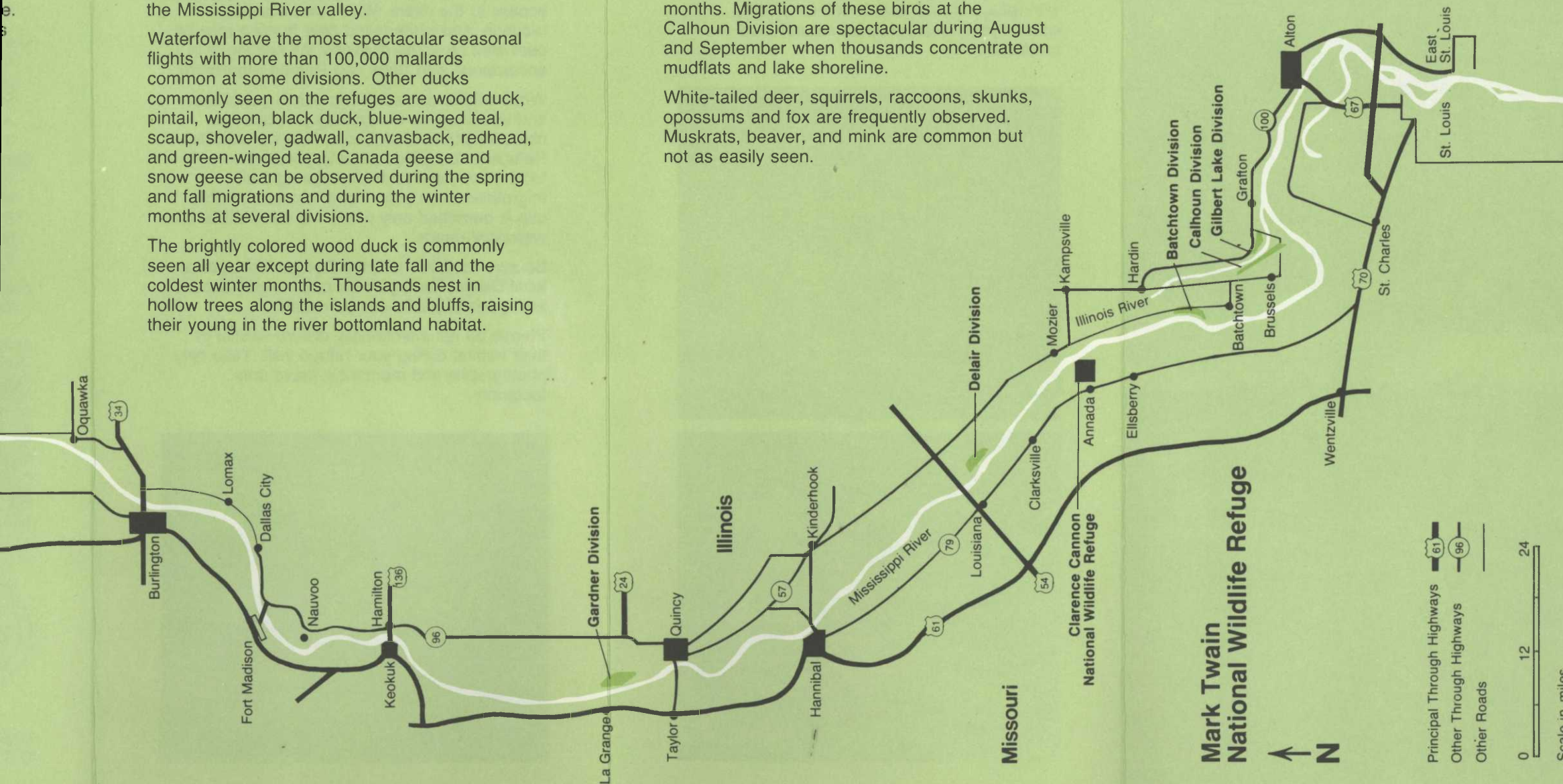
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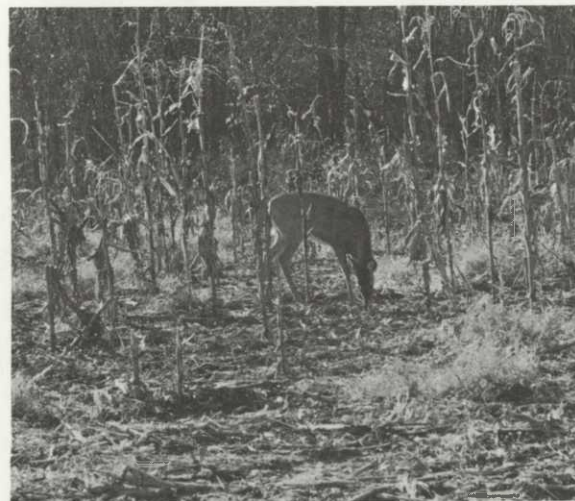
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Land management

Water level manipulations are often used to provide food for waterfowl. Impoundments are drained in early summer to allow natural plants such as smartweed and wild millet to grow. These moist soil areas are then flooded in the fall to provide food for migrating waterfowl. Many moist soil units once were refuge farmlands which often were too wet to produce dependable food crops every year.

On higher ground, standard farming practices produce corn, soybeans, buckwheat, millet, green wheat and clover. These areas are farmed by local farmers on a share-crop basis with refuge shares usually left for wildlife consumption to supplement natural food production.



Recreation

The opportunity to see waterfowl, marsh and waterbirds, shorebirds, white-tailed deer, and other wildlife in their natural habitat is available at all divisions. Interpretive foot trails are located on some divisions. Observation overlooks and roads adjacent to most refuge units provide an excellent opportunity to see wildlife in natural habitats without unduly disturbing them.

Fishing, mushroom and berry picking, hiking and related wildlife oriented activities are permitted in certain areas open to the public. Several refuge units also provide public boat access to the rivers. Waterfowl, squirrel, raccoon, and white-tailed deer hunting may be permitted on some divisions. All hunting is in accordance with State and Refuge regulations.

While wildlife-related public use is permitted and encouraged, the primary purpose and objective of the Mark Twain National Wildlife Refuge is to provide migratory waterfowl with food, water, and protection during their migrations each year. For this reason, public use is permitted only when it is compatible with waterfowl needs.

Be sure to check with the Refuge Manager or local District Managers for open areas, dates and types of public use permitted.

Please do not intentionally disturb wildlife or their habitat during your refuge visit. Take only photographs and memories; leave only footprints.



Information

Additional information can be obtained from

Refuge Manager
Mark Twain National Wildlife Refuge
Suite 100, 311 N. 5th Street
Quincy, Illinois, 62301
(217) 224-8580

Subheadquarters for the refuge divisions are:

Louisa — Keithsburg — Big Timber
Refuge Manager
Mark Twain National Wildlife Refuge
Rural Route No. 1
Wapello, Iowa 52653
319/523-6982

Cannon — Delair
Refuge Manager
Mark Twain National Wildlife Refuge
P.O. Box 88
Annada, Missouri 63330
314/847-2333

Batchtown — Calhoun — Gilbert Lake
Refuge Manager
Mark Twain National Wildlife Refuge
Box 142
Brussels, Illinois 62013
618/883-2524

Gardner Division
Contact Quincy office

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



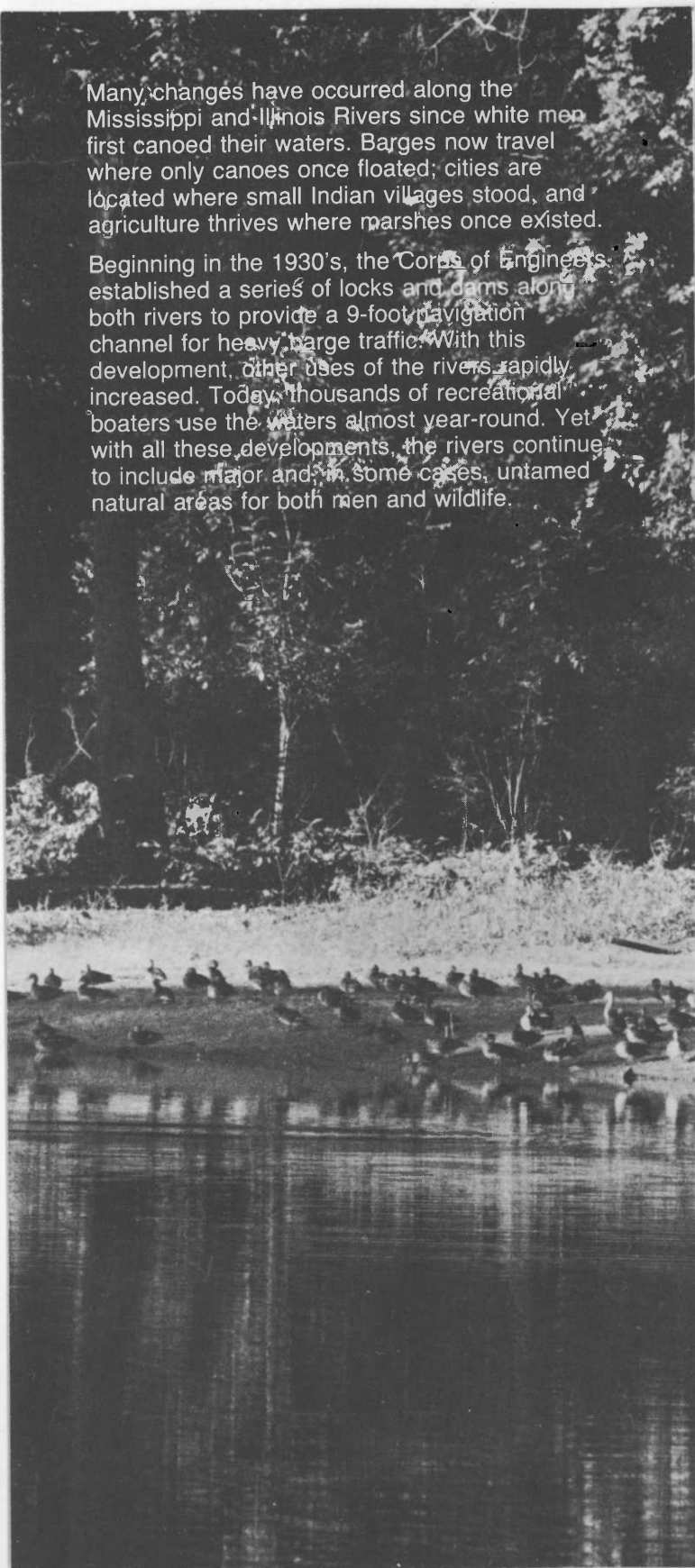
Department of the Interior
U.S. Fish and Wildlife Service

Mark Twain National Wildlife
Refuge



Many changes have occurred along the Mississippi and Illinois Rivers since white men first canoed their waters. Barges now travel where only canoes once floated; cities are located where small Indian villages stood, and agriculture thrives where marshes once existed.

Beginning in the 1930's, the Corps of Engineers established a series of locks and dams along both rivers to provide a 9-foot navigation channel for heavy barge traffic. With this development, other uses of the rivers rapidly increased. Today thousands of recreational boaters use the waters almost year-round. Yet with all these developments, the rivers continue to include major and, in some cases, untamed natural areas for both men and wildlife.



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Department of the Interior
U.S. Fish and Wildlife Service

Birds

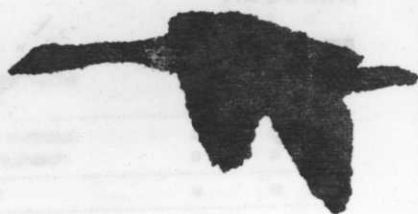
Mark Twain

National Wildlife Refuge

Illinois, Iowa,
Missouri



Birds



Mark Twain National Wildlife Refuge is in the heart of the Mississippi River Valley in Illinois, Iowa, and Missouri.

It was established in 1958 for the protection and preservation of migratory waterfowl, although many other wildlife species thrive in its bottomlands, islands, fields, marshes, sloughs, ponds, and other backwater areas.

Because the refuge's 23,500 acres are scattered over 250 miles of the Mississippi and Illinois rivers, this bird list provides information for the refuge's four main geographic regions:

Gardner Division is a series of 32 islands containing 4,831 acres. Much of the refuge is old growth maple, cottonwood, and mixed hardwood forest; however, 750 acres are farmed for waterfowl and other wildlife food. The Gardner Division is 12 miles north of Quincy, Illinois in the Mississippi River and is accessible only by boat. Headquarters is located at 311 N. Fifth, Suite 100, Quincy, Illinois 62301.

The *Brussels District* contains three divisions, all in Illinois: Calhoun (4,500 acres on the Illinois River in Calhoun County), Gilbert Lake (656 acres on the Illinois River in Jersey County) and Batchtown (2,249 acres on the Mississippi River in Calhoun County). Lands are typical river bottomlands composed of backwater sloughs and lakes bordered by hardwood timber and farm fields which frequently are inundated by floodwaters. The district office is located just off county road 754, approximately 4 miles southeast of Brussels, Illinois.

The *Annada District* is composed of two divisions: Clarence Cannon National Wildlife Refuge, Missouri (3,747 acres) and Delair Division, Illinois (1,620 acres). They contain cropland, sloughs and small lakes which are protected from the river by a levee system. They were purchased in 1964 with duck stamp funds to increase habitat for migratory birds along the Mississippi River. The Annada District is headquartered at Clarence Cannon NWR, 1½ miles east of Annada, Missouri, about 60 miles northwest of St. Louis.

The *Wapello District* contains three divisions: the Louisa Division, Iowa, including Turkey and Otter Islands (2,609 acres), Big Timber Division, Iowa (1,757 acres), and the Keithsburg Division, Illinois (1,400 acres). The refuges consist of bottomland timber, marsh interlaced with fingers of water, cropland, ponds, and sloughs. Large numbers of waterfowl, including geese, use Louisa during their migration. The Wapello District Office is approximately 7 miles east-northeast of Wapello, Iowa, midway between Muscatine and Burlington, Iowa.

The following bird list contains 235 species, representing observations since 1938. Those species marked with an asterisk (*) have nested on the refuge. This list is in accordance with the current A.O.U. Check-list. Visitors wishing to add their observations to future listings should contact the District Refuge Manager. Abundance symbols are grouped under columns representing the four seasons of the year, as follows:

G — Gardner Division	S — March-May
B — Brussels District	s — June-August
A — Annada District	F — September-
W — Wapello District	November
	W — December-
	February.

* — Nests locally (Local nesters are indicated by division or district)

a-abundant	very numerous common species
c-common	certain to be seen in suitable habitat
u-uncommon	present, but not certain to be seen
o-occasional	seen only a few times during a season
r-rare	seen at intervals of 2 to 5 years
accidental	seen only once or twice on the refuge, out of normal range

Solid line between species — Orders
Dotted line between species — Families

	S	s	F	W
G B A W Common Loon				o
G B A W Horned Grebe	o		o	o
G B A W Pied-billed Grebe	c	u	c	u
G B A W White Pelican			r	
G*B*A*W* Double-crested Cormorant	u	u		
G*B*A*W* Great Blue Heron	c	c	c	c
G*B*A*W* Green Heron	c	c	c	
G B A W Little Blue Heron	u	c	c	
G B A W Cattle Egret	r	u	o	
G B A W Great Egret	c	c	c	
G B A W Snowy Egret	r	u		
G*B*A*W* Black-crowned Night Heron	c	u	u	
G*B*A*W* Yellow-crowned Night Heron	c	u	u	
G*B*A*W* Least Bittern	u	u		
G B A W American Bittern	u	r	u	
A Glossy Ibis			r	
A White Ibis		r		
G B A W Whistling Swan	o	r		
G B A W Canada Goose	c	o	c	c
G B A W White-fronted Goose	u		u	o
G B A W Snow Goose	c		c	c
G B A W Mallard	c	c	a	a
G B A W Black Duck	c		c	c
G B A W Gadwall	c	r	c	o
G B A W Pintail	c	o	a	c
G B A W Green-winged Teal	c	u	c	u
G B A W Blue-winged Teal	c	u	c	
G B A W American Wigeon	c		c	u
G B A W Northern Shoveler	c		c	u
G*B*A*W* Wood Duck	c	a	a	o
G B A W Redhead	c		c	c
G B A W Ring-necked Duck	c		c	c
G B A W Canvasback	u		u	u
G B A W Greater Scaup	o		o	o
G B A W Lesser Scaup	a		c	c
G B A W Common Goldeneye	u		u	c
G B A W Bufflehead	u		u	u
G B A W Oldsquaw			o	
G B A W Ruddy Duck	a		c	u
G*B*A*W* Hooded Merganser	u	u	u	u
G B A W Common Merganser	u		u	a
G B A W Red-breasted Merganser	u		u	
G*B*A*W* Turkey Vulture	c	c	c	
A Mississippi Kite		r		
G B A W Goshawk			o	r
G B A W Sharp-shinned Hawk	u	u	u	u
G*B*A*W* Cooper's Hawk	o	o	o	c
G*B*A*W* Red-tailed Hawk	c	u	c	c
G B A W Red-shouldered Hawk	u	u	c	u
G B A W Broad-winged Hawk	o	o	o	
G B A W Rough-legged Hawk	o		o	o
G B A W Golden Eagle	u		o	r
G B A W Bald Eagle	u		u	c
G B A W Marsh Hawk	u		u	u
G B A W Osprey	u		u	o
G B A W Peregrine Falcon	o		r	
B Merlin	r		r	
G*B*A*W* American Kestrel	u	u	u	u
G*B*A*W* Bobwhite	c	c	c	c
W Ring-neck Pheasant	o	o	o	o
G B W King Rail	o	r		
G B A W Virginia Rail	u	r		
G*B*A*W* Sora	c	u	c	
G B W Common Gallinule		o	o	
G*B*A*W* American Coot	c	u	a	u

	S	s	F	W
G B A W Semipalmated Plover	o		u	
G*B*A*W* Killdeer	c	c	c	o
G B A W American Golden Plover	u		r	
G B A W Black-bellied Plover	c		o	
G*B*A*W* American Woodcock	c	c	c	
G B A W Common Snipe	c		c	o
G B A W Upland Sandpiper	o			
G*B*A*W* Spotted Sandpiper	c	c	c	
G B A W Solitary Sandpiper	c	c	c	
G B A W Willet	r			
G B A W Greater Yellowlegs	c	c	c	
G B A W Lesser Yellowlegs	c	c	c	
B Red Knot			r	
G B A W Pectoral Sandpiper	c	c	c	
B White-rumped Sandpiper	r		r	
A Baird's Sandpiper	r			
G B A W Least Sandpiper	c	c	c	
G B A W Dunlin	u		u	
G B A W Short-billed Dowitcher	u		u	
G B A W Long-billed Dowitcher	u		u	
G B A W Stilt Sandpiper	u	r	u	
G B A W Semipalmated Sandpiper	u	u	u	
G B A W Western Sandpiper	r	u		
G B A W American Avocet			r	
G B A W Wilson's Phalarope	r		o	
B A Northern Phalarope	r		r	
G B A W Herring Gull	u		u	c
G B A W Ring-billed Gull	c		c	c
G B A W Franklin's Gull	o		o	
G B A W Bonaparte's Gull	r		r	
G B A W Forster's Tern	u		u	
G B A W Common Tern	o		o	
G B A W Least Tern			o	
G B A W Caspian Tern	u	o	u	
G B A W Black Tern	c	o	u	
B Rock Dove	c	c	c	c
G*B*A*W* Mourning Dove	c	c	c	u
G*B*A*W* Yellow-billed Cuckoo	c	c	c	u
G B A W Black-billed Cuckoo	r		r	
G*B*A*W* Screech Owl	c	c	c	c
G*B*A*W* Great Horned Owl	u	u	u	u
G*B*A*W* Barred Owl	c	c	c	c
G B A W Long-eared Owl				o
G B A W Short-eared Owl			o	o
G B A W Chuck-will's-widow	o			
G*B*A*W* Whip-poor-will	o			
G*B*A*W* Common Nighthawk	u	u	o	
G*B*A*W* Chimney Swift	c	c	c	
G*B*A*W* Ruby-throated Hummingbird	c	c	o	
G*B*A*W* Belted Kingfisher	u	u	u	o
G*B*A*W* Common Flicker	c	c	c	c
G*B*A*W* Pileated Woodpecker	c	c	c	c
G*B*A*W* Red-bellied Woodpecker	c	c	c	c
G*B*A*W* Red-headed Woodpecker	c	c	c	c
G B A W Yellow-bellied Sapsucker	c		c	
G*B*A*W* Hairy Woodpecker	u	u	u	u
G*B*A*W* Downy Woodpecker	c	c	c	c
G*B*A*W* Eastern Kingbird	c	c	c	
G*B*A*W* Great Crested Flycatcher	c	c	c	
G*B*A*W* Eastern Phoebe	u	u	u	
C B A W Yellow-bellied Flycatcher	u		u	
G B A W Acadian Flycatcher	c	c	c	
G B A W Willow Flycatcher	r	o		
G B A W Alder Flycatcher	r	o		
G B A W Eastern Wood Pewee	c	c	c	

	S	s	F	W
— G B A W Horned Lark	c	c	c	c
— G*B*A*W* Tree Swallow	c	c	a	
— G*B*A*W* Bank Swallow	c	c	c	
— G*B*A*W* Rough-winged Swallow	c	c	c	
— G*B*A*W* Barn Swallow	c	c	c	
— G B A W Cliff Swallow	c	c	c	
— G*B*A*W* Purple Martin	c	c	c	
— G*B*A*W* Blue Jay	c	c	c	c
— G*B*A*W* Common Crow	c	c	c	c
— G*B*A*W* Black-capped Chickadee	c	c	c	c
— G*B*A*W* Tufted Titmouse	c	c	c	c
— G*B*A*W* White-breasted Nuthatch	c	c	c	c
— G B A W Red-breasted Nuthatch	o	o		
— G B A W Brown Creeper	u		u	o
— G*B*A*W* House Wren	o	o		
— G B A W Winter Wren			o	o
— G*B*A*W* Carolina Wren	c	c	c	o
— G B A W Long-billed Marsh Wren	o	o	o	
— G B A W Short-billed Marsh Wren	u	o	u	
— G*B*A*W* Mockingbird	c	c	c	o
— G*B*A*W* Gray Catbird	u	u	u	
— G*B*A*W* Brown Thrasher	c	c	c	o
— G*B*A*W* American Robin	c	c	c	o
— G*B*A*W* Wood Thrush	o	o		
— G B A W Swainson's Thrush	u	u		
— G B A W Gray-cheeked Thrush	u	u		
— G B A W Veery	u	u		
— G*B*A*W* Eastern Bluebird	u	u	u	u
— G*B*A*W* Blue-gray Gnatcatcher	c	c		
— G B A W Golden-crowned Kinglet	u		u	o
— G B A W Ruby-crowned Kinglet	u	u		
— G B A W Water Pipit	o	o		
— G*B*A*W* Cedar Waxwing	u	u	u	u
— G*B*A*W* Loggerhead Shrike	o	u	u	o
— G*B*A*W* Starling	c	c	c	c
— G*B*A*W* White-eyed Vireo	c	c	c	
— G B A W Yellow-throated Vireo	u	u		
— B Solitary Vireo	r			
— G*B*A*W* Red-eyed Vireo	c	c	c	
— G*B*A*W* Warbling Vireo	c	c		
— G B A W Black and White Warbler	u		u	
— G*B*A*W* Prothonotary Warbler	c	c	c	
— G B A W Warm-eating Warbler	u			
— G B A W Golden-winged Warbler	o	o		
— G B A W Tennessee Warbler	u	u		
— G B A W Orange-crowned Warbler	u	u		
— G B A W Nashville Warbler	u	u		
— G B A W Northern Parula	u	u		
— G*B*A*W* Yellow Warbler	u	u	u	
— G B A W Magnolia Warbler	u	u		
— G B A W Yellow-rumped Warbler	c	c	c	o
— B Black-throated Green Warbler	r		r	
— G*B*A*W* Cerulean Warbler	u	o		
— G B A W Yellow-throated Warbler	o			
— G B A W Chestnut-sided Warbler	u		u	
— G B A W Blackpoll Warbler	u		u	
— A Pine Warbler	o			
— G B A W Palm Warbler	u		u	
— G B A W Ovenbird	u		u	
— G B A W Northern Waterthrush	c		u	
— G B A W Louisiana Waterthrush	u		u	

	S	s	F	W
— G*B*A*W* Kentucky Warbler	u	u	u	
— B Mourning Warbler			r	
— G*B*A*W* Common Yellowthroat	c	c	c	
— G*B*A*W* Yellow-breasted Chat	u	u	u	
— G B A W Wilson's Warbler	u	u		
— G B A W Canada Warbler	u	u		
— G*B*A*W* American Redstart	c	c	c	
— G*B*A*W* House Sparrow	c	c	c	c
— G*B* European Tree Sparrow	u	u	u	c
— G B A W Bobolink	u			
— G*B*A*W* Eastern Meadowlark	c	c	c	u
— G*B*A*W* Red-winged Blackbird	a	a	a	c
— G*B*A*W* Orchard Oriole	u	u		
— G*B*A*W* Northern Oriole	c	c		
— G B A W Rusty Blackbird	u		u	r
— G B A W Brewer's Blackbird				r
— G*B*A*W* Common Grackle	a	a	a	c
— G*B*A*W* Brown-headed Cowbird	c	c	c	
— G*B*A*W* Scarlet Tanager	u	u	u	
— G*B*A*W* Summer Tanager	u	u		
— G*B*A*W* Cardinal	c	c	c	c
— G B A W Rose-breasted Grosbeak	u		u	
— G*B*A*W* Indigo Bunting	c	c	c	
— G*B*A*W* Dickcissel	c	c	c	
— G B A W Evening Grosbeak				r
— G B A W Purple Finch	u		u	u
— G B A W Pine Siskin				r
— G*B*A*W* American Goldfinch	c	c	c	c
— G*B*A*W* Rufous-sided Towhee	u	u	u	
— G B A W Savannah Sparrow	u		u	
— B Le Conte's Sparrow			r	r
— B Sharp-tailed Sparrow			r	
— G B A W Vesper Sparrow	u	u		
— G B A W Lark Sparrow	o			
— G B A W Dark-eyed Junco	c		c	a
— G B A W Tree Sparrow	c		c	c
— G B A W Chipping Sparrow	u		o	
— G*B*A*W* Field Sparrow	c	c	c	o
— G B A W White-crowned Sparrow	c	c	c	o
— G B A W White-throated Sparrow	c		c	u
— G B A W Fox Sparrow	u		u	o
— G B A W Lincoln's Sparrow	o		o	
— G B A W Swamp Sparrow	c		c	c
— G*B*A*W* Song Sparrow	c	c	c	c

Accidental Species

— B Western Grebe
— G B A W Brant
— G B A W Barrow's Goldeneye
— G B A W Black Scoter
— B White-winged Scoter
— B Prairie Falcon
— G B A W Sandhill Crane
— G B A W Yellow Rail
— B Piping Plover
— G B A W Glaucous Gull
— B Lapland Longspur

Notes

Date _____ No. Species _____

Time Afield _____

Observers _____

Weather _____

Remarks _____

Information

Additional information
can be obtained from
Refuge Manager
Mark Twain
National Wildlife Refuge
Suite 100, 311 N. 5th Street
Quincy, Illinois 62301
(217) 224-8580



**Department of the Interior
U.S. Fish and Wildlife Service**

K. FEEDBACK

This was an exceptionally productive year at Cannon and I would like to relate my impression of the work of the Service and effects on Clarence Cannon Refuge in 1987.

First and foremost, the assistant managers, the maintenance mechanic and the secretary at Cannon are all highly skilled, highly motivated, top notch people and have done an excellent job in working towards accomplishing the goals and objectives of the refuge. Credit for most of the accomplishments must go to them.

Secondly, we received good support from the Mark Twain Refuge Complex in Quincy. Quincy staff spent considerable time working on development of refuge leaflets and interpretive panels for the deck, administering of the hunting and trapping programs, and coordinating aerial seeding of wheat on the Gardner Division.

The Louisa and Calhoun Districts of the Mark Twain National Wildlife Refuge both contributed to the law enforcement efforts on the Gardner Division. The Calhoun District loaned their Case dozer for work on Delair. The Quincy support also included a couple of sessions of serious "counseling" to keep the manager on the right track. This was done in a positive, constructive, and professional manner and I am sure the sessions improved overall management of the refuge.

Thirdly, comments, encouragement and support from RF-2 were greatly appreciated. I am pleased to have had the privilege to work under John and Jay.

Fourthly, we tapped the services of many support divisions in the Regional Office during the year and cooperation was excellent. Engineering provided substantial support to the refuge on the levee rehabilitation, the deck project, and the ditching project at Delair. We especially enjoyed Bill Greenwald's visits and his tips on the stock market! Personnel provided guidance in terminating a problem employee, assisted in recruiting temporary employees, helped to quickly fill the assistant manager position after McKinney transferred, and perhaps most importantly, kept the payroll checks coming on time. Technical Services provided art work and laid out the refuge brochure and interpretive panels for the deck plus guided us through successful volunteer and Take Pride in America efforts. Facilities Management assisted in tracking projects and insuring the paper requirements were met on various projects plus submitted a flood damage assessment which resulted in a 1.1 million supplemental appropriation. Realty worked on the acquisition of two small parcels of land critical to maintaining the refuge levee. Safety was helpful in processing workers compensation claims for the tractor operator and in managing a safe work environment for our staff. Information Resource Management arranged for a new computer system for the refuge. Contracting and General Services

assisted in the disposal of an excess building and grain bin, and awarded contracts for the levee rehabilitation and ditch projects plus processed the acquisition for new radio equipment and a seeding project.

The Special Agent in Jefferson City provided valuable information for upgrading the communication capabilities on the refuge. The Special Agent in St. Charles provided law enforcement coverage on and in the vicinity of the refuge at times.

A lot of good work was accomplished for the benefit of the resources and refuge visitors in 1987. The information above is only a partial list of support received during the year. My thanks go to all who contributed to this effort.